# Better Crops WITH PLANT FOOD

June 1929 10 Cents

The Pocket Book of Agriculture

## Timken-Equipped Implements Make Farms Prosperous

As power-farming has progressed the need for saving has grown and Timken Tapered Roller Bearings have universally met that need by conserving power and preserving farm implements for long, continuous service.

Only Timken offers exclusive advantages such as these: Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS* and Timken-made steel to carry all loads, radial and trust.

Those whose concern it is to point the way toward modern farm progress look upon Timken Bearings as an economic force *wherever wheels and shafts turn.*

THE TIMKEN ROLLER BEARING COMPANY
C A N T O N , O H I O

**TIMKEN** *Tapered Roller*
**BEARINGS**

# Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Managing Editor* SID NOBLE, *Editor*

*Editorial Offices:* 19 West 44th Street New York

VOLUME XII NUMBER SIX

## TABLE OF CONTENTS, JUNE, 1929

Romance 3
*June "Gets" Jeff*

Cotton Wilt Control 5
*A Fertilizer Story, by J. C. Pridmore*

Tennessee 8
*Another Experiment Station Story, by A. J. Sims*

Spraying Potatoes 15
*A Timely Article, by E. R. Lancashire*

Industry Presses Onward 16
*The Second of G. J. Callister's Series*

Agriculture Today 19
*The Entomology Story of This Series, by Frank George*

Flax 23
*A Crop Story, by Walter H. Ebling*

Weeds or Crops? 24
*An Article on Noxious Weeds, by A. L. Stone*

This Crop Loves Potash 26
*Robt. M. Salter Discusses Alfalfa*

Why Cultivate? 27
*It Is Not Necessary, According to E. N. Bressman*

The Strawberry Season 28
*Is Lengthening, by C. B. Sherman*

Plowing in India 43
*A Story of Foreign Agriculture, by J. J. DeValois*

Agricultural and Scientific Bureau
N. V. POTASH EXPORT MY.
*of Amsterdam, Holland*
*Directors:* J. N. HARPER G. J. CALLISTER

SEE-SAW!

Better Crops with Plant Food

Published Monthly by the Better Crops Publishing Corporation, 19 West 44th Street, New York. Subscription, $1.00 Per Year; 10c per Copy. Copyright, 1929, by the Better Crops Publishing Corporation, New York.

Vol. XII NEW YORK, JUNE, 1929 No. 6

Jeff says that this is not the only month for—

# *Romance*

By Jeff McDermid

ROMANCE should not be confined to balmy nights of June and faded Knights of heraldry. It should not be laid away amid crumbling rose petals and beaded bridal slippers, becoming only a mossy epitaph above forgotten hopes.

Once upon a time a man I knew very well became engrossed in bread-winning and forgot a reminiscent bouquet of jonquils as a wedding reminder for the woman who shared his life. He never quite recovered from the effect of this relapse of romantic memory, but his error will not be repeated.

There was no breakage of furniture or household calamity involved, but his failure to acknowledge the truth of his troth and the firmness of his faith deprived him of that peace of mind which every earnest husband cherishes.

There are times when flowers are as important and sustaining to life as groceries, provided the love of the giver is stronger than the tissue they are wrapped in. On this sentimental journey of ours, affection plus recognition is better than affection taken for granted.

No true woman ever gets beyond the romantic stage, but she doesn't like to mark the calendar ahead so that her partner won't overlook the

marital milestones. Yet on the other hand, it takes a pretty adroit man to anticipate such dates of conjugal consequence without being suspected of ulterior motives. Sudden and unforeseen attacks of romance hold some danger for the zealous husband to adopt. Hence chronic romance is a better disease than the acute kind that breaks out like the measles and soon disappears.

"Behold, the Bridegroom cometh," says the Good Book; and good men who follow the Book as best they may should measure their steps occasionally to the hushed cadences of the long-ago Lohengrin.

"Behold, the Bridegroom cometh," so let him gallantly give arm once more to the devoted one who has spanked his kids and kept him out of jail with sentiment and sacrifice. The bridegroom cometh, but not so fast as he goeth under our commercialized circumstances.

THERE is a rasping old saw to the effect that "all the world loves a lover." The only thing of this kind that the world admires more than a youthful swain is an elderly "old-school" gentleman whose constancy toward his wife is as delicately reverent as his age.

Once I went with my wife-to-be on a joyful summer outing, and we saw a grandpa proudly and blushingly tender a nosegay to his spouse. We saw him help her over the rough places and find her a comfortable seat. If my memory serves me right, my little Friend confided to me that she hoped my ardor and devotion would be as lasting and endearing on the down grade when we faced the sunset.

I have never forgotten that admonition, and she at least has done nothing to make that same sentiment less probable. If expectant brides would thus open life's vistas to the visions of their lovers there would be a more wholesome index afforded to the book of life. Pink cheeks, fair hair, and glowing eyes do not last forever. They are only the tempting preface to the chapters of a text-book of many pages, often hard to read and sometimes difficult to understand.

Brides are just as faulty and short-sighted in this as their companions. They think only in terms of June and seldom turn the leaves of the almanac in anticipation to December. So we see that romance itself is in need of foresighted conservation measures, just like our other natural resources.

I claim that a well-balanced romanticism is more important to us as a nation of creditable citizens than hard work, common sense, and religion. We cannot enjoy the last three fully without some inkling of the former trait in our lives.

Hymeneal education is often sadly deficient. From the time when adolescents are told that sentiment is "silly" to the time when the judge fixes the alimony, what sort of conjugal curriculum do we provide? Next to nothing. We have experimental colleges in liberalism; we have professors of eugenics and genetics; we have authorities on weight reducing, Chinese rugs, and salads—but we lack an intelligent course in a combination of such things that make weddings permanent and romance lasting. Our students go to college and get romance languages and musical harmony, but they are often deaf and dumb to both things after leaving the altar.

YET I am convinced that most marriages are as successful as anybody could expect of a nation which puts most of its sentiment in the twenty-five-cent magazines. I believe we should credit our children with more discernment in the romance line than we often give them ourselves. Thus a father who remembers his wedding

(*Turn to page* 61)

# Cotton Wilt Control

*By J. C. Pridmore*

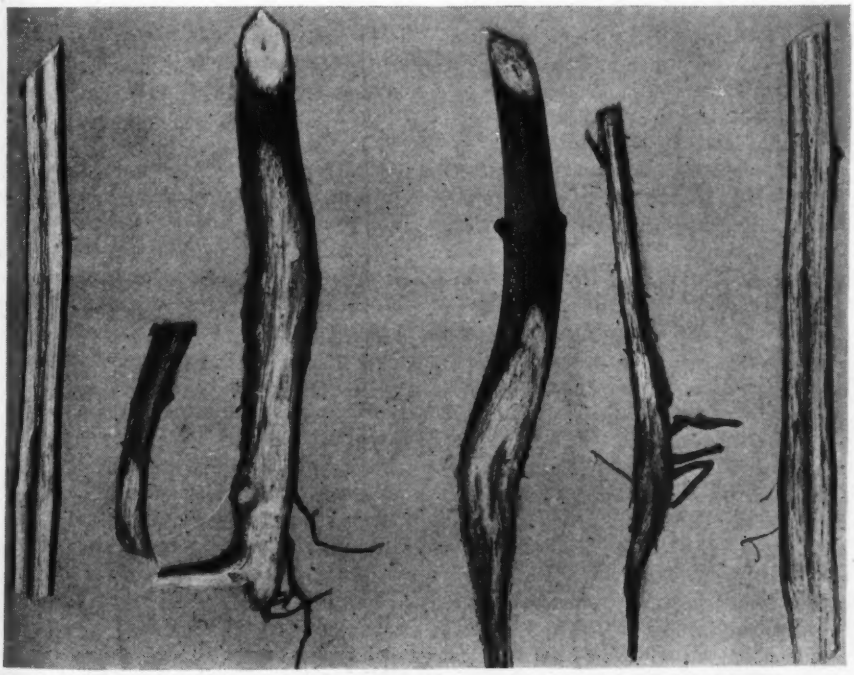
Director, Southern Division, Soil Improvement Committee

PLANTS are susceptible to many diseases just as human beings are. Cotton is no exception to this rule for this plant, like others, has a long list of diseases that may attack it and prevent its normal growth and development, precluding the possibility of a satisfactory yield and profit to the planter.

While the cotton plant is susceptible to a number of diseases, probably the most important, from an economic standpoint, is wilt. The damage caused by this disease in cotton naturally varies because of soil and seasonal conditions, the variety of cotton used, kind and amount of fertilizer used, and probably other factors. This particular disease, however, is widely distributed over the cotton belt and will spread over still larger areas from year to year unless preventive measures are employed.

It is difficult to estimate accurately the annual cost of the presence of wilt to the farmer in the cotton belt. Naturally it is worse in some localities than others. It is worse some years than others. In the light of available information, it is safe to estimate that the annual toll from this disease alone amounts to from 10 to 15 per cent of the crop in some states, or an average loss of one-half million or more bales per year for the belt.

The cause of cotton wilt is now



The three stalks on the left are from normal, healthy cotton plants; those on the right show wilt-diseased tissue.

Where an 8-4-0 was used, there were missing hills and dead plants. The yield was only 666 pounds seed cotton per acre.

known to be a fungous growth or development. It is able to live in the soil over a period of several years, which makes impracticable the use of rotations of crops as a control measure.

Evidences of the appearance of wilt in fields may be found when plants begin to wilt and die without any apparent cause. Areas affected usually appear in more or less circular sections of the field, frequently in close proximity, and cover the entire field on badly infected land. The easiest method of discovering the plant infected with wilt is to cut cross-wise in the root or near the ground the stem of a freshly wilted plant, and if dark brown or black areas appear on the cut surface this indicates that the plant is wilt diseased.

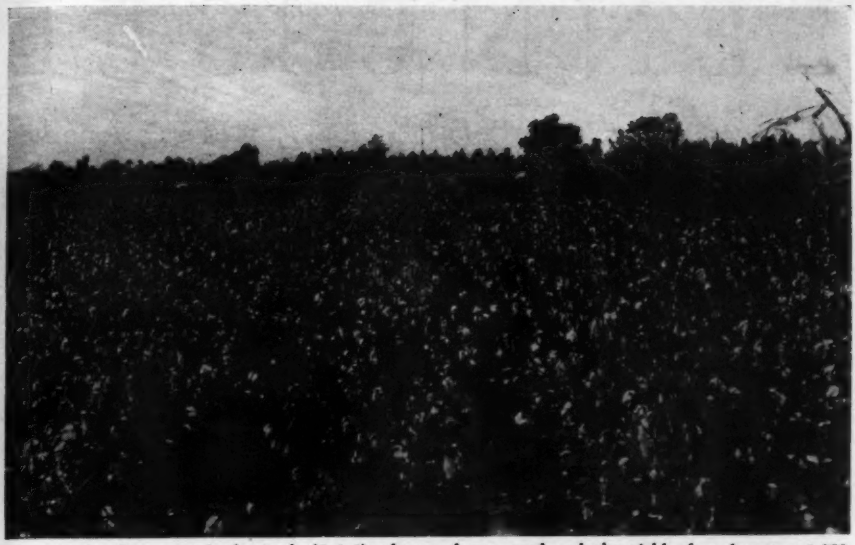
In order to get more complete information on the causes and remedial measures in the control of cotton wilt, Dr. D. C. Neal, Plant Pathologist of the Mississippi Agricultural Experiment Station, began some investigations on the subject in 1925.

For a long time, it has been thought by farmers, as well as others, that the nutrition of the plant has a direct bearing upon its resistance to wilt. Practical demonstrations have been conducted that would lead one to believe that well-nourished cotton plants have resistance and do not succumb to the attacks of wilt as is the case with poorly nourished plants.

### *Show Importance of Potash*

An outstanding demonstration of this character was conducted by L. E. Rast in 1922 while he was with the southern division of The National Fertilizer Association, cooperating with C. N. Alexander near Little Rock, Arkansas, with a view of determining whether fertilizers could be used to advantage in this particular soil. The grower used 500 pounds per acre of a fertilizer containing 10 per cent phosphoric acid, 3 per cent nitrogen, and no potash, during 1920. That year the rust was so plentiful and the yields so small that no records were kept of the yields.

The following year the same amount of a 10-3-0 fertilizer was applied on half the area and to the other half an additional application of 500 pounds of kainit was applied. On the area



When the fertilizer contained potash (8-4-6), the stand was good and the yield of seed cotton 1,278 pounds per acre.

where the 10-3-0 was used the plants began dying long before maturity was reached and appeared to be infected with wilt fungus. Upon investigation Dr. C. W. Elliott of the Arkansas Experiment Station, who examined the fields, found approximately 95 per cent of the plants wilt-infected where no potash was used, and this area yielded only 225 pounds of seed cotton per acre.

On the adjacent field where the 500 pounds per acre of a 10-3-0 fertilizer had been applied and supplemented with 500 pounds per acre of kainit, Dr. Elliott stated that there was no evidence of wilt, and from this plot 1,127 pounds of seed cotton per acre were harvested. This demonstration serves to confirm general reports from farmers who have had similar experiences which lead them to believe that a well-balanced fertilizer is one of the factors of cotton wilt control.

Using these general reports, and such evidence as was available at the time as a guide, Dr. Neal set out in the beginning of his work to study the relationship of the nutrition of plants to wilt resistance, in addition to other angles of the problem. In his greenhouse experiments the data are not conclusive, but in his field experiments to determine the effect of commercial fertilizer upon the control of wilt, definite indications are determined, particularly in the fields at the Poplarville, Mississippi, Station where the land was most heavily infected.

On the experiment station plots at Poplarville, approximately 1/12 of an acre in size, where each plot had been given the same treatment for five years, excellent opportunities were afforded for wilt study in 1926 and 1927. From these studies in 1926 the following data were obtained:

| | Fertilizer Used | Analyses | Seed Cotton per acre lbs. | % Wilt |
|---|---|---|---|---|
| Plot | No. 1 | 8-4-0 | 666 | 45.84 |
| " | No. 2 | None | 468 | 22.19 |
| " | No. 3 | 8-4-3 | 1206 | 17.76 |
| " | No. 4 | 8-4-6 | 1278 | 1.04 |
| " | No. 5 | None | 648 | 2.22 |
| " | No. 6 | 8-4-6 | 1080 | .92 |
| " | No. 7 | 4-4-13 | 1080 | 1.21 |
| " | No. 8 | None | 216 | 2.78 |
| " | No. 9 | 0-4-6 | 630 | .15 |
| " | No. 10 | 8-0-6 | 486 | .0 |
| " | No. 11 | None | 72 | .19 |
| " | No. 12 | 8-8-16 | 990 | .0 |

(Turn to page 50)

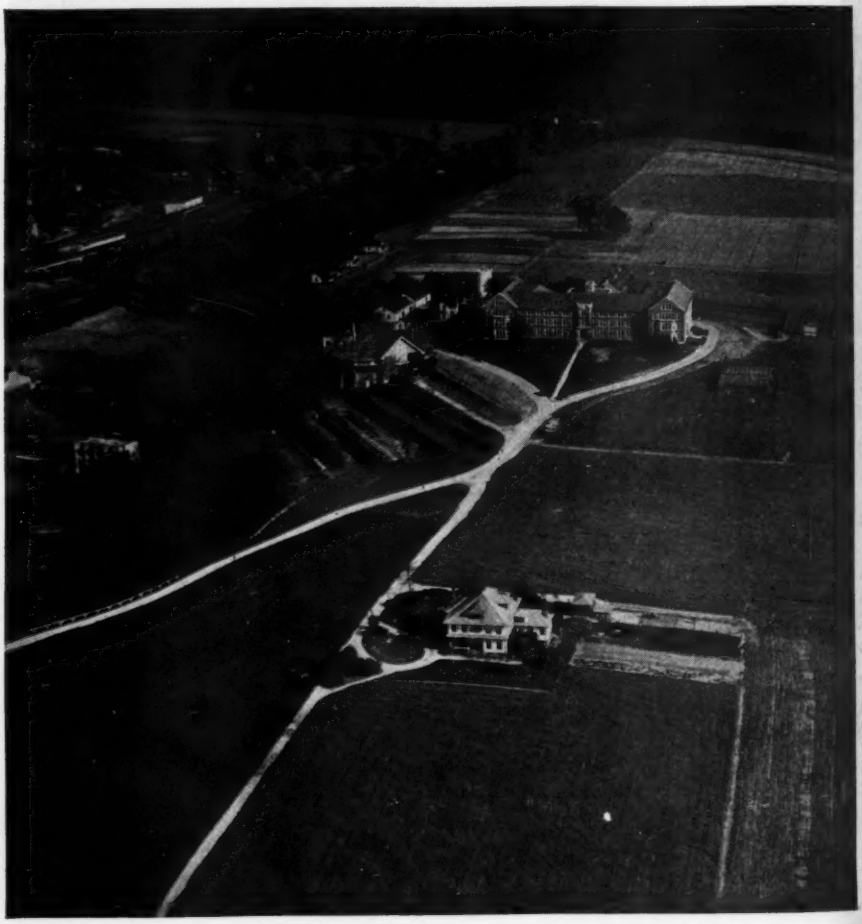
# TENNESSEE

*By A. J. Sims*

Agricultural Editor

¶ Here's Another Station Story.

BEGINNING with a staff of five men and 100 acres of land in 1887, the Tennessee Experiment Station has developed a program to match the wide diversity in the farming interests of the State. Today there is scarcely a tiller of the soil from the delta, cotton-growing lands of West Tennessee to the mountain coves of East Tennessee who has not benefited by the work of the institution. A staff of 30 specialists is employed and the experimental plots, fields, pastures, feedlots, orchards, and the State's four substations and farms contain approximately 1,000 acres with two-score buildings and purebred herds and flocks. Enough wealth has been realized by the State from the results of research, experiments, investigations, and recommendations of the Station to cover many times over the



cost of the entire University which runs into millions of dollars.

The board of trustees of the University of Tennessee was the first, and, with the exception of Cornell University, the only corporation in the United States to establish an agricultural experiment station without any special endowment. It was also one of the first five stations to be established in America.

The Station developed out of a combined school

**C. A. Mooers, Director of Tennessee Agricultural Experiment Station.**

**Left: A bird's-eye view of a part of the experiment station farm at Knoxville.**

of agriculture, horticulture, and botany which was started in 1870 at Knoxville. The College of Agriculture had been founded in 1869 under the first Morrill Act, passed by Congress in 1862. The original college farm consisting of 100 acres, where the experimental work of the main station is now carried on, was also purchased that year.

Professor Hunter Nicholson was the first head of the school, and experimental work was begun by Professor J. M. McBryde who was at the head of the school from June, 1879, to June, 1882. Experimental work done by Professor McBryde with field crops

and livestock feeding led to the establishment of the Experiment Station as a distinct department of the University in June, 1882, with Professor John W. Glenn as its first director. Professor McBryde severed his connection with the institution in 1882 to take the presidency of the University of South Carolina. He later became president of the Virginia Agricultural and Mechanical College and Director of the Virginia Experiment Station.

### *Introduced Bordeaux Mixture*

In 1887 the Station was reorganized under the Hatch Act of Congress, which gave to it an annual income of $15,000, and was placed under the immediate supervision of a director and a committee of five members of the board of trustees of the University. Dr. Charles W. Dabney, Jr., newly elected president of the University was also made director of the station. He had associated with him, four specialists: Charles S. Plumb, assistant director, in charge of field and feeding experiments; E. Lamson Scribner, botanist and horticulturist; W. E. Stone, chemist; and H. E. Summers, entomologist.

All of these men later gained nation-wide prominence either in educational or investigational work. Professor Plumb is noted for his work in animal husbandry at Ohio State University, Professor Summers was professor of entomology and entomologist for the experiment station at Iowa State College for a number of years. Dr. Stone became president of Purdue University. Professor Scribner left the institution in 1894 to join the staff of the United States Department of Agriculture as agrostologist.

Professor Scribner introduced into this country from France the celebrated bordeaux mixture which was used by him for the first time in America in spraying a vineyard near Knoxville where it was applied to prevent rot of grapes. The tests were successful. Other experiments covering a wide range of disease control were made and now this mixture is considered indispensable in the production of grapes, peaches, and other crops throughout the country.

The Station at the time of its reorganization in 1887 was without buildings, laboratories, apparatus, li-

A tomato plant grown from wilt-resistant seed, selected at the Tennessee Station, was healthy and normal in every respect.

brary, or other equipment. A small building on the campus which had been used by the agricultural school was turned over to it. In 1890 Dr. Dabney was made chemist and Professor Scribner was elected director and botanist. During this year the college farm of 100 acres with its buildings, equipment, and livestock was turned over to the station. One of the conditions of the transfer was that the farm should be so conducted that it would serve to illustrate the methods taught in the agricultural classes.

Charles F. Vanderford, professor of agriculture in the University, was made assistant director of the station and manager of the farm in 1891. In 1893 the office and title of director were abolished and the duties of the director were transferred to the president of the University who was assisted by a secretary. Professor Vanderford was selected for this office. That same year Professor C. A. Mooers, now director of the station, joined the staff as an agricultural chemist, and Professor S. M. Bain was added to the staff as assistant botanist.

Professor Vanderford died in 1899 and Dr. Andrew Soule, now president of the Georgia Agricultural and Mechanical College, was elected to succeed him. In 1903 Dr. Soule was made director and the Station entered an era of rapid development such as it had never experienced before. The State Legislature became interested and in 1903 made its first appropriation to the Station, $10,000 for the purchase of 40 acres of land adjoining the 100 acres already owned. Farmers of the State for the first time began to take a real interest in the work of the Station and requests for branch experimental farms began to be heard.

**This tomato plant, grown in the same patch as the one on the opposite page but from ordinary seed, was badly damaged by wilt.**

Progress was temporarily interrupted in 1904 by the resignation of Director Soule to become director of the Virginia Experiment Station, Blacksburg. He took with him the assistant agriculturist and the assistant for plat work. Dr. H. A. Morgan, now president of the University, was selected to succeed Dr. Soule as director. Dr. Morgan came from Louisiana State University where he was professor of entomology in the university, entomologist for the experiment station, and state entomologist. He was elected president of the University in 1919 but continued as director until 1923. Professor C. A. Mooers, who had been chemist and agronomist for several years was acting director from 1919 to 1923 and director and agronomist from 1923 to the present time.

### *Investigations Are State-wide*

Tennessee being a state of multiform soil types, it became evident early in the history of the Station that experimental work must be conducted in the sections of the different soil

types. It was realized that a central station, carrying on some investigations that applied to the State as a whole, could not render the needed service along agronomic and soil lines. The State appropriation for the branch station in West Tennessee at Jackson was followed in 1917 by a similar appropriation for a Middle Tennessee station at Columbia. Dairy and beef cattle herds are maintained at both places and extensive experiments with all the leading crops of each section are carried on.

In 1907 the Bureau of Entomology of the U. S. Department of Agriculture established some tobacco insect investigations at Clarksville, Montgomery county, in cooperation with the Station. In 1913 there was established at the same place a substation for other tobacco investigations in cooperation with the U. S. Bureau of Plant Industry which has been of much value in determining the most profitable kinds of fertilizers, the effect of liming, and the comparative effects of various crop rotations on tobacco. The value of work of this kind so impressed a prominent citizen of Clarksville, Hunter M. Merewether, that he gave the University a farm and buildings valued in the neighborhood of $40,000 to be used for permanent investigation in agriculture.

The headquarters of the scientific staff, the laboratories, and special equipment of the Station are located at the University of Tennessee at Knoxville. The chief lines of investigation now being carried on are as follows:

Plant-food and lime requirements and the crop adaptabilities of the various soil types throughout the State; the effects of liming on various soil constituents, such as nitrogen, sulphur, and potash; maintenance and increase of soil nitrogen; study of crown gall, or "hairy root," a serious trouble of apple trees that threatens the nursery business of the State; a study of the root rot of wheat and the possibility that this disease is materially reducing the wheat yield; selection and breeding of various crops to get strains immune or highly resistant to the wilts and blights which are prevalent; and the fluosilicates as insecticides;

For a number of years the Station has been studying, particularly by laboratory methods, two important subjects, soil nitrogen and the effects of various liming materials when applied to the soil. The laboratory methods, which have included the use of plots, cylinders, and lysimeters or leaching tanks, have been supplemented by field experiments. The lysimeter equipment, the essential features of which were developed by Director Mooers, has been enlarged from time to time until it is now the most extensive to be found anywhere. This equipment has enabled the Station's present soil chemist, Dr. W. H. McIntire, to make an enviable reputation by his investigations concerning liming.

### *Conclusions Are Reached*

Listed below are some of the practical conclusions reached from the field and laboratory studies.

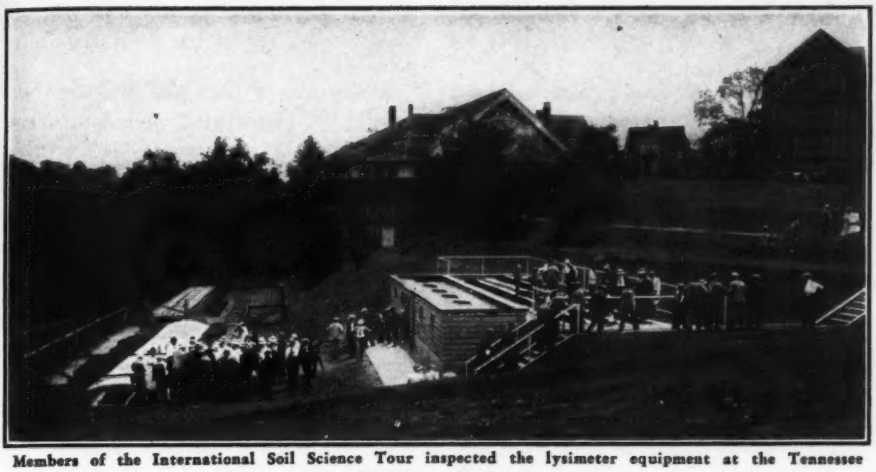
1. Large areas of the State have become greatly depleted in soil nitrogen, so that an increase of this element is a first requisite to their improvement.

2. Crops of alfalfa, sweet clover, and red clover are the most efficient practical means of increasing the supply, but such legumes as cowpeas and soybeans must be either pastured off or turned under to be of any special value.

3. Nitrogen is lost from the soil both by the removal of crops and by leaching. Soil in grass which was harvested yearly for hay was found to lose much less nitrogen than the same soil on which cowpeas harvested for hay were grown and the soil left bare through the winter.

4. The larger the crops grown, of any kind, the more is the soil supply of nitrogen conserved, soluble soil nitrogen not utilized by crops being lost by leaching.

5. Limestones are generally cheapest, are the easiest to apply, are "fool-



**Members of the International Soil Science Tour inspected the lysimeter equipment at the Tennessee Experiment Station.**

proof," and in the Station's experiments were found to be effective over a longer period than burnt lime which may be used to advantage under some conditions. Other materials, such as marl and wood ashes, may be used when available. Liberal applications of duplex basic phosphate were found to supply sufficient lime for red clover on some soils.

6. Alfalfa and sweet clover have the highest lime requirements; next come red, alsike, and white clovers, also garden beets. Cowpeas, soybeans, corn, wheat, hay grasses, and a number of garden crops are highly responsive to liming on Tennessee soils, but liming was found of little direct benefit to cotton, tobacco, peanuts, sweet potatoes, and strawberries, though it may be of much indirect benefit to some of these crops when they follow clover, for which liming is necessary.

### *Lime Increases Yields*

In five series of experiments on representative soils in different sections of the State, the average yield of alfalfa with lime was 3.13 tons per acre of cured hay, but without lime only 1.16 tons. In 11 series of experiments, the average yield of clover hay on common soils of East, Middle, and West Tennessee was 2.31 tons per acre with lime; but only 1.48 tons and badly mixed with weeds, where no lime was used.

Numerous experiments have been made to determine the effects of liming on both corn and wheat under common farm conditions throughout the State. The results show a marked and rather uniform increase in yield from liming. In 12 series the average yield of corn was 36.5 bushels per acre where limed, but where unlimed the average was only 30.8 bushels. The actual increase in bushels per acre for wheat on limed land is not so great as for corn, but the percentage increase is about the same.

The average yield of 13 series with soybeans was 1.78 tons of cured hay per acre under liming, and 1.45 tons without liming. The average of eight series with cowpeas was 1.13 tons of hay per acre under liming, and 0.85 tons without liming.

The effect of even a moderate liming was found to last for a number of years. Appreciable increases in crop yields from a single application have continued for at least eight years at the Station. To build up a poor soil that is deficient in lime without the aid of liming is an especially difficult task for several reasons. One reason is that the best improvement crops cannot be satisfactorily grown where lime is deficient. With the aid of

ground limestone, clover flourishes on farms where it has long been a stranger.

The effects of liming both on crop production and on changes taking place in the soil have been subjects of special investigation by the Station. Much of the work is only of scientific interest at the present time but may well be of practical significance as the knowledge of soils increases.

### *Liming Increases Potash Need*

A rather outstanding practical discovery was made, however, in the continuous experiments in a rotation of cowpeas and wheat, with regard to the effects of liming on the availability of soil potash, which was clearly demonstrated to become more quickly deficient on limed land than on unlimed land. Later it was shown in lysimeter tests that less potash leached from limed than the unlimed soil. Still later soil samples from various places in the State where lime and fertilizer experiments were being conducted were analyzed for water-soluble potash with the result in nearly every instance that less potash was obtained from the limed than the unlimed soil. The conclusion seems now to be well established that liming will increase the soil need of potash rather than diminish it as has been generally believed.

More than $3,000,000 is spent annually by Tennessee farmers for fertilizer, and it is conservatively estimated that five times this amount could be profitably utilized. The Station maintains a staff which long has been studying the various soil types, their plant food requirements, the most economical fertilizers for the various types, lime requirements, crop rotations, etc. The most extensive work done by the Station is along these lines and the results have laid a solid foundation for the rational use of fertilizers and for the improvement of the various kinds of soil found in the State, which has been subdivided into a dozen or more well-defined large areas with special requirements.

The Station has conducted experiments for 19 years to determine the value of barnyard manure in increasing soil fertility. The average gross returns in increased crop yields were found to vary greatly with the crop on which the manure was used, but averaged more than $4.00 per ton of manure.

(*Turn to page 56*)

**Tobacco plants at the Clarksville, Tennessee, Station show the effect of fertilization. The plants on the left received four pounds of 8-4-4, while those on the right were unfertilized.**

This is what happened when the pressure dropped in turning the sprayer around at the ends of the rows. The plants in the foreground are all dead, while those in the background are alive and healthy.

# Spraying Potatoes

By *E. R. Lancashire*

Ohio State University

RECENTLY the Ohio Experiment Station released information to the effect that bordeaux mixture has an insecticidal value. This work was done on the potato leafhopper. It was found that the copper in bordeaux mixture entered the juices of the potato plant and that when the leafhopper sucked these juices into its body the copper caused the insect's death.

There is a feeling among potato men that the shading effect of a copper-lime bordeaux is another valuable aid to the potato crop. Then there is the older and better known repellent action of bordeaux against insects and the fungicidal action on potato foliage diseases such as early and late blights. Some have reported that a stimulation of the foliage results from the action of the copper in the bordeaux on the plant. This stimulation has been noted even when insects and diseases were almost entirely absent. All things considered, such an imposing array of reasons for the use of a bordeaux spray would make the proposition worthy of investigation.

Where leafhoppers are plentiful, spraying is especially desirable. These small active insects have sucking mouth-parts with which they remove the potato juices. This fact alone would not be serious. On withdrawing their mouth-parts these leafhoppers leave some toxic substance which in time causes the tips and edges of the leaves to turn brown, become crisp, and take on a burned appearance.

This often occurs a few weeks before the normal death of the vines. In such a case the potato plants are dead before the tubers are much more than half grown. Many times the vines die down within a few days. Often the grower thinks some disease has wiped out the field. Where leafhoppers are uncontrolled, it is very rare that the foliage is not entirely killed by the last part of August.

Leafhoppers work on the under side

(*Turn to page* 51)

# Industry Presses Onward

¶ *Bringing to colleges of agriculture and to industries that serve agriculture special problems and opportunities.*

*By G. J. Callister*

IN the preceding paper it was shown that industry is more and more being regarded as fundamental to our national life, rather than incidental to it; that this change is exerting far-reaching influences in our every-day affairs; and that the great need of industrial activity today is for a more definite goal. It was further noted that even though agriculture is behind in the march, industries that more specifically serve agriculture still have made significant contributions to the march of industry as a whole. Far-reaching internal and external adjustments in production and distribution have been effected. Technically trained forces to aid the farmer in the utilization of the products of industry have been organized. These technical forces are growing in number and the scope of their activities.

Thus agricultural industries and the forces of scientific agriculture are confronted with problems and opportunities that have much in common, problems which must be solved if their respective and growing obligations to the farmer and society are to be fulfilled.

The soundness of two broad viewpoints, therefore, is of vital importance: First—that of the changes and developments within industry and especially their causes; Second—that of the derivation of sound principles on which the work of the various groups involved may be harmonized.

To refer briefly to the first viewpoint, among such developments are the modern phases of the so-called industrial revolution, the influence of labor and science in this movement, the effect of such forces in adding to the social responsibility and scope of business management, the necessary distinction between agricultural and urban industries, and finally the vital emphasis that now is being placed on the utilization of the products of industry, for around this emphasis on utilization centers some of the chief problems with which management has to deal. Capacities for production and distribution are being revolutionized. An increased emphasis on a more scientific, fruitful, and socially acceptable utilization is inevitable.

It is the purpose of this article to discuss briefly these developments within industry.

### *II Industry Changes*

That there has been and still exists a revolution in modern industry hardly needs to be proved. Many publications proclaim this fact. The term is common currency in contemporary literature. Only recently, American, British, and European authors have

used it. For instance, Wallace B. Donham[1] says:

"It is not at all strange, therefore, that the early advances of the industrial revolution brought about shocking abuses, . . ."

The British author, Sheldon[2], uses the term in a more qualified sense:

"We have traveled fast; in a few years, as in the era in the so-called Industrial Revolution . . ."

The French author, Andre Siegfried[3], states:

"Now, two huge events have taken place since; namely, the Industrial Revolution, which has transformed the conditions of production, and the World War, which has completely altered the relations of Europe with other continents."

Undoubtedly, the term "industrial revolution" properly represents in most countries an evolutionary social movement, characterized by relatively slow growth and orderly development, rather than a radical, sudden change. It has culminated in many industries, in standardization of operations, and mass production.

Whether good or bad, desirable or not, this industrial revolution is going on. It is affecting society; its effects cannot be ignored. If agricultural industries are to make sound adjustments of these changing conditions; if confusion and loss are to be avoided, then the causes of this change within industry are of some practical and social significance, to everyone connected with agriculture.

What are the causes? According to Sheldon, there are two causes within industry making for change—labor and science. These two causes, he points out, are of major importance.

"Looking immediately ahead, the two major forces making for change with which management has to deal are Labour and Science. The greater the changes these forces portend, the greater the responsibility of management for the safe pilotage of the vessel. The activities of these two forces indicate most surely that the sea which has to be traversed in the years ahead will be far from placid."

Thus both labor and science are vital forces within industry making for industrial change; for the evolution of changing concepts and practices.

### *III Utilization Comes In*

We are concerned here particularly with the influence of science, especially in the field of industrial utilization in connection with the technical forces organized within industry. The significance of this influence in industry is strengthened by the fact that the effect of science on industry, trade, and commerce, is far from a modern development. As a practical concept it has been part of the thought of man for centuries.

Glance backward a moment. For instance in the Middle Ages, it is recorded that science transformed the whole social system of certain centers, even in that remote day. Paul LaCroix[4] brings this point out rather vividly.

"Venice, which had so long been hostile to the psychological chemists, showed favour to practical and working chemists, and the same was the case in the cities and states where commerce throve. The metallurgists demonstrated to the public that they would consult their interests—always the main motive of human progress—by allowing them to construct blast-furnaces, foundries, and manufactories and in this way they transformed in a few years the whole social system."

If the social system of today is being transformed by the aid of science in industry, it is at least nothing new.

---

1—Donham, Wallace B. Harvard Business Review, Vol. V, No. 4, July, 1927.

2—Sheldon, Oliver. Philosophy of Management.

3—Siegfried Andre, Harvard Business Review, Vol. VI, No. 1, Oct., 1927.

4—LaCroix, Paul. Science and Literature in the Middle Ages.

There is an age-long precedent for this.

Stepping forward a few centuries to the seventeenth, the needs of trade and commerce were the chief reasons for granting the charter to the Royal Society in England in 1662. In fact, in that day men of trade and commerce belonged to the Royal Society for the good and practical reason that it was hoped that by such means the results of experimental work would be made available for the good of trade. As Ornstein[1] has recorded on this subject—

"Side by side with purely scientific problems, there went a consideration of things relating to trade and commerce and manufacture; and it was this phase of their interests which, especially in the first instance, won them royal patronage."

About the same time (1686) the practically-minded Louvois sent word to the French Academy to make the work of the Academy more practical. At a later date the classic scientific work of Liebig in aiding the establishment of the potash industry in Germany is well known, as is the work of John Lawes in England, who in the early days spent half his time in a superphosphate plant in London. Apparently the practical application of scientific work to easing the day's burden always has appealed to men.

### *America Steps In*

Turning to America, at the end of the eighteenth century, industry, of course, was limited. The organized emphasis of scientific work was on medical societies and to cultivate "every art and science which may tend to advance the interests, honor, dignity, and happiness of a free, independent and virtuous people." At least this was the object in organizing more than one of the scientific societies of the day, a perfectly natural emphasis. People first looked after their health, their happiness, independence, and their virtue and dedicated science to these purposes. Whether the modern emphasis of science on industry is any real progress may be open to question.

To be more exact, prior to 1800 there were founded in the United States 12 scientific societies, 8 of them medical. In the first half of the nineteenth century there were founded 30 societies, more than half of these were medical. Even in 1870-80, when there were founded 52 scientific societies, twice as many as in the previous decade, medical societies still held first place. But of course in this period also were formed, as in the previous decades, other scientific societies, historical associations, natural history societies, etc. The modern organization of societies is well known, and it is in this modern organization that science has been more definitely linked with the growth of industry.

Broadly speaking, while the results of scientific work have been more or less allied with trade, commerce, and industry in a groping fashion since the Middle Ages, it is not until recent decades that Man has emancipated himself socially, has subdued continents, and has gained the time to develop scientific work or to avail himself fully of the results of such work in industry. The new thing is not the concept of science in industry; it is the volume and intensity of application.

Thus, both from a contemporary and historical viewpoint, science as an influence in commerce and industry is a fundamental part of Man's thought and social effort, a vital part of his thinking, and undoubtedly will continue to be a force with which Man will have to seriously reckon in the decades immediately ahead.

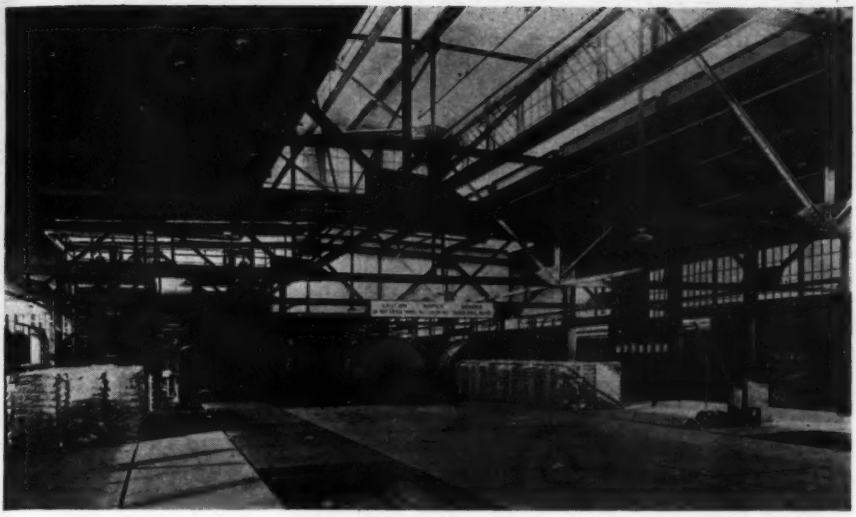
This power of science influences two broad divisions of industry, namely,

(*Turn to page 47*)

---

NOTE: "Many of their number are men of traffic which is a good omen that their attempts will bring philosophy from words to action, seeing that men of business have had such great share in the first foundation . . . Several merchants, men who act in earnest, have adventured considerable sums of money to put in practice what some of our members have contrived." Robert Hooke.

1—Ornstein, Martha. The Role of Scientific Societies in the Seventeenth Century.



Cotton fumigation plants have been established at Mexican border ports to prevent the entry of cotton pests into the United States.

# Agriculture Today

## VII. Entomology

*By Frank George*

ENTOMOLOGISTS now are centering their attention upon the Japanese beetle, the cotton boll-weevil, and the European corn borer, the three leading crop pests in present-day American agriculture. The Japanese beetle at the close of the 1928 summer season occupied an area of approximately 20,000 square miles in New Jersey, Pennsylvania, Delaware, New York, Connecticut, Massachusetts, Maryland, and Virginia; the cotton boll-weevil is entrenched solidly in practically all parts of the cotton belt, and the corn borer is steadily encroaching upon the corn belt.

"It became evident soon after investigations of the Japanese beetle were begun in 1917," declares Dr. A. L. Quaintance, associate chief of the Bureau of Entomology, "that extermination measures were not feasible, and that efforts should be made to prevent long distance rather than local spread. Rapid multiplication and extensive feeding on economic crops indicated the possibility that the Japanese beetle would become one of the more serious of the introduced foreign pests."

Estimates compiled by the Crop Reporting Board indicates that for the cotton belt as a whole, yields per acre in 1927 were reduced more than 19 per cent by the cotton boll-weevil, the smallest percentage of damage being 1.3 per cent in 1911, and the largest percentage 31.2 per cent in 1921. Until 1914, boll-weevil dam-

age was confined largely to the states west of the Mississippi River, and it was not until 1922 that it had spread over the entire cotton belt.

Regarding the corn borer, Dr. Quaintance says, "this pest is truly a grave menace to corn growers, but the outlook is not so dark as it first appeared. The clean-up method of control has been proved effective in Kent and Essex counties, Ontario, where complete destruction of the corn crop was observed over large areas in 1925 and 1926. Through the practice of clean-up measures, the corn borer has been reduced during both 1927 and 1928 in these areas."

Early realization of the potential seriousness of the Japanese beetle led to the inauguration of a quarantine in 1918 by the New Jersey Department of Agriculture, and since then quarantines have been maintained by the Federal Horticultural Board, the State of New Jersey, and, later by the States of Pennsylvania, Delaware, New York, and Connecticut. The first quarantine included only green, sweet, or sugar corn, since at that time this was believed to be the commodity most likely to carry the insect to points outside the garden area.

These regulations have been changed from time to time to meet the changed conditions brought about by the extension of the infested area and increase in the density of infestation. During the season of 1928 the movement of all farm products, with the exception of certain root crops and dry seeds, was restricted. Restrictions were also placed upon the movements of all nursery stock, sand, soil, peat, compost, and manure. It has been considered that restricting and safeguarding the movement of nursery stock and other plants are perhaps the most important phases of the quarantine work. These efforts, so far as known, have entirely prevented the distribution of the insect with nursery products during the last 10 years.

### *Parasites Control Beetles*

Government entomologists have been making investigations in the Orient to discover and ship to this country parasites which are known to attack the Japanese beetle, and five species of these parasites have been established in New Jersey, New York, and Pennsylvania. One of these is a tachinid fly which has spread outward from the central point of liberation over an area of approximately 90 square miles. This parasite attacks the adult beetles.

Two dexiids, parasitic on larvae of the Japanese beetle, have been found to be established during the past year,

Native Japanese are employed to collect insect parasites of the Japanese beetle.

Release cages are used in the introduction of parasites of the alfalfa weevil.

and two solitary wasps have been introduced and are now established in this country. One of these, *Tiphia popilliavora,* was sufficiently numerous in 1927 near Riverton, New Jersey, to permit the establishment of 11 subcolonies of this parasite in New Jersey and Pennsylvania. At present, two members of the bureau are located in Japan and Korea, and one in northern India, for the purpose of collecting and rearing parasites for shipment to the United States.

### *Poison the Boll-weevil*

"In the early days of boll-weevil experience," Dr. Quaintance says, "we were forced to rely almost entirely on cultural methods of control, and for many years cotton was successfully grown under that system. The natural conclusion is that it still has merit, and should be carefully practiced. Briefly, these cultural methods include the selection of an early maturing variety of cotton, planting the seed as early in the spring as is consistent with the procurement of a good stand of vigorous plants, the fall destruction of cotton plants by burning or plowing under, and the destruction of all volunteer plants in the spring."

Within comparatively recent years more direct methods of control by the use of calcium arsenate, aimed at the adult weevils rather than the larvae, have been developed. Criticism is heard frequently of the recommendation not to begin poisoning until 10 to 15 per cent of the squares are punctured, but Dr. Quaintance defends this procedure because the cotton plant normally puts on many more squares than can be matured, and a certain number are shed naturally. Up to a certain point, squares which are shed because of weevil infestation merely take the place of healthy squares which the plant would otherwise discard.

Question is raised as to whether it pays to use poison dust on cotton. It will pay to poison according to Dr. Quaintance, if the weevils are really injurying the crop seriously; if the land is sufficiently fertile to yield at least one-third bale per acre with weevil injury eliminated; and if the farming organization is such that the poison applications will be made at the right time and in the right manner. Farmers should not poison if the cost of the calcium arsenate, the cost of the labor to apply it, and the depreciation on the dusting machines will total more per acre than the current value of 100 pounds of seed cotton.

Farmers who use poison are urged to use only pure calcium arsenate in the form of a dry powder, applied in the dust form. The poison should contain not less than 40 per cent total arsenic pentoxid, not more than 0.75 per cent water-soluble arsenic pentoxid, and have a density not less than

80 or more than 100 cubic inches per pound. The poison should be used when the air is calm and the plants are moist, at the rate of about 5 to 7 pounds of calcium arsenate per acre for each application.

The cotton must be thoroughly dusted until the weevils are under control, which usually means about three applications at the rate of one every four days. If the weevils become abundant early enough to injure the young bolls, one or two more applications may be made late in the season. A heavy rain within 24 hours after dusting requires a repeat application immediately.

### *Search for Borer Parasites*

The corn borer was first discovered near Boston, Massachusetts, in 1917 when it was estimated that it had infested about 100 square miles of territory. Investigation of the pest was begun immediately and as the borer advanced into new territory, the Federal organization for research was expanded. At present, research problems regarding the corn borer are being studied at six Federal laboratories scattered throughout the infested area of the United States, and at one laboratory maintained in central Europe to study the insect in its native habitat. The search for effective parasitic enemies of the pest is being carried on by Federal entomologists in Europe and the Orient.

The use of parasites which prey upon insects that destroy American crops is regarded by some entomologists as the most effective means of holding these crop pests in check. Approximately 100,000,000 predatory parasitic insects, representing 45 different species, have been brought from Europe and released in Northeastern states to prey on the Gipsy moth. At least fifteen of the species have become established and are attacking the insect. More than 500,000 insects of eleven species of parasites which attack the Japanese beetle have been imported from Japan and liberated in the United States.

The search for parasites of the corn borer is being intensified as part of the national campaign against this pest. Entomologists with headquarters at Hyeres, France, are seeking the parasites in France, Italy, Spain, and Portugal. As yet, only 12 species of parasites of the corn borer have been found, of which six have become established in the United States. The ideal of the entomologist is to find parasites which will attack the borer in each stage of its development.

### *Orchards Saved by Beetles*

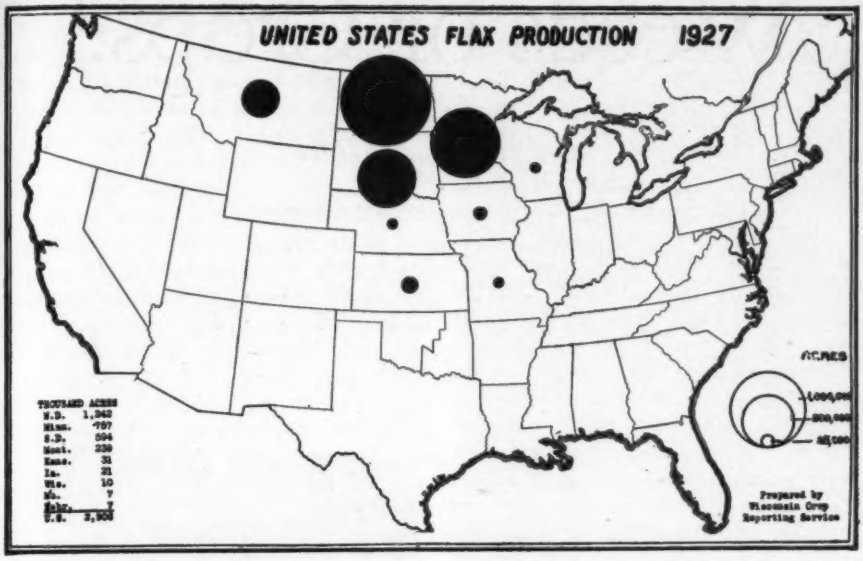
The Federal practice of finding and rearing parasites to attack crop pests began with the introduction of a ladybird beetle from Australia into the citrus orchards of California to check the ravages of the cottony cushion scale which threatened to destroy the citrus fruit industry. Entomologists obtained 127 specimens of the ladybird beetle which has been discovered in Australia feeding upon the scale. These beetles were released in the infested orchards in California, and within 18 months they had practically cleaned out the pest.

Since then, many species of introduced parasites and predacious insects captured in foreign countries by the Government entomologists have been imported and are assisting in holding in check the scale insects, aphids, and mealybugs in the citrus orchards of Florida and California. These beneficial species are being reared in large numbers in laboratories in California.

### *Fumigate Imports*

Practically all foreign insect pests which have become established in the United States gained entry prior to the organization of the Federal quarantine system, only the pink boll-worm hav-

(*Turn to page* 55)




# FLAX ¶ *Seventh of our crop series*

## *By Walter H. Ebling*

Agricultural Statistician, Wisconsin

FLAX is one of the historic crops which has long held an important place in the affairs of men. Its use for both oil and fiber has been common the world over for centuries.

The world crop at the present time still is grown for these two main purposes, oil and fiber production. The seed for oil is grown under widely different conditions and in nearly all countries. Fiber production, on the other hand, is limited largely to a few European countries, Russia leading. Recently it has been begun on a small scale in America.

The United States is not an important flax producer, growing only about 15 per cent of the world total and ranking fourth among the nations. The Argentine Republic leads with 35 per cent, followed by Russia with 22 per cent and India with 17 per cent. The production in the United States is limited almost entirely to seed which is used in the manufacture of oil. The four leading flax states are North Dakota, Minnesota, South Dakota, and

(*Turn to page 56*)

# Weeds or Crops?

*By A. L. Stone*

Agronomist, Wisconsin College of Agriculture

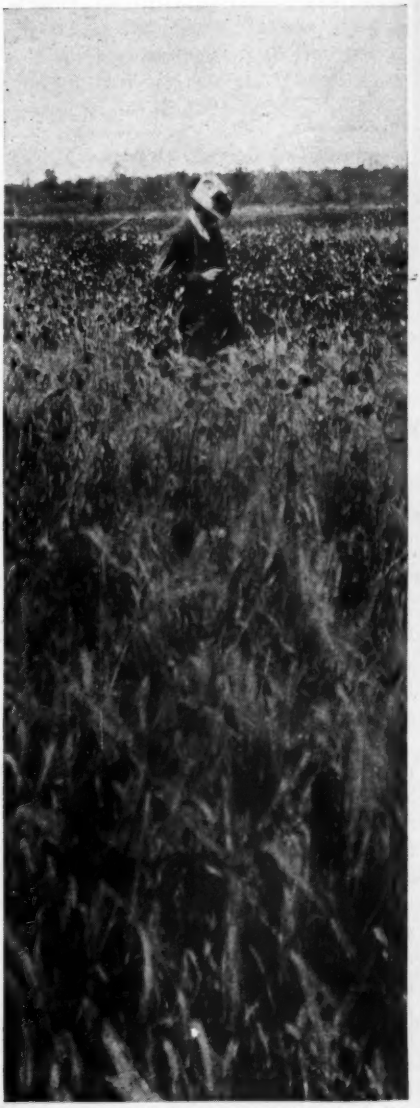
In many sections of the country farmers neglect noxious weeds like quack grass and Canada and sow thistles in a way that astonishes the observer. As one drives along the roads and notes acres of Canada and sow thistles going to seed in pastures and grain fields and no apparent attention being given to them, he wonders what is the philosophy behind this indifference to what seems like an extremely serious condition of affairs.

Conversation with the owners or renters on the infested farms shows that there are a number of reasons why the weeds are neglected. Some say that the lack of help makes it impossible to devote any time to weed-killing. Care must be given to the growing crops. Haying and harvesting follow closely after the "laying by" of the corn. Threshing follows harvesting. Neglect of any of these will be sure to cause a loss of crop which the farmer can ill afford. Labor is now more plentiful, and this plea has ceased to be a reason and has become an excuse.

Others say that they do not worry about the weeds because it makes little difference whether maximum crops are raised when the prices of farm products are so low. It is just as well to raise a small crop, "because the smaller the crop the better the prices."

On still other farms there are renters who have nothing in the contract with the farm owner stipulating that they shall cut or destroy the noxious weeds.

Many of these farms are operated on short time leases and the renter's interest is only temporary. His great aim



Perennial sow thistles have nearly ruined this barley field.

is to get the most possible off the farm with the least possible outlay in labor. To him time spent in weed cutting or eradication seems wasted effort. Sometimes the owner of the farm is a nonresident, and unless the weed commissioner comes and cuts the weeds they go to seed unharmed.

Some farmers say that a few patches of noxious weeds are a good thing because more intensive cultivation is required to keep the weeds down and this results in bigger crops than would be obtained if the weeds were not there and less cultivation were given. Somehow it never seems to occur to the men who advance this argument, that the same amount of cultivation could be given and a still larger crop raised if there were no weeds there. To use weed infestation as an argument for crop cultivation seems peculiar to say the least. It is a poor excuse.

The theory that the destruction of noxious weeds is a task to be undertaken only when there is nothing else to do is responsible for the appalling conditions in some of our northwestern states where Canada thistles or perennial sow thistles have taken possession of thousands of acres of our most productive lands. Many farmers who think things through and especially those who read good farm papers are beginning to wonder if this theory, that weeds can be neglected, is a good one.

### *Render Pastures Useless*

While to care for and harvest the crops is, of course, essential, there is no doubt that in some cases it would pay better in the end to reduce the crop areas somewhat and devote more time to the destruction of weeds. On a recent trip the writer saw fields so thickly infested with Canada thistles that there was no possibility of raising any kind of crop on them. Fields of 20 or more acres supposed to be pasture were utterly useless as such. There were grain fields in which from

Quack grass, if given a good start, makes short work of a cornfield.

five to fifty per cent of the area was producing thistles instead of grain. In other fields the purple blossoms of the Canada thistle mingled with the yellow of the perennial sow thistles.

Hay fields were nearly as bad as the grain fields. One farmer who was asked if the thistles were not a nuisance in the harvested hay and grain said, "Oh yes, we have to wear buckskin gloves while handling it." In some sections noxious weeds already occupy completely an average of 25 per cent of the farm land. Strenuous campaigns are being started in the Dakotas, Minnesota, and Wisconsin to stir up the farmers to the danger which confronts the farming interests of those states.

Noxious weeds are spreading at an appalling rate. Anyone who doubts it has only to take an automobile trip through the states mentioned. And yet the farmers go on neglecting them without thinking of the future and what the result is sure to be if such neglect continues.

(*Turn to page* 54)

# Fertilize Your Alfalfa

*By Robt. M. Salter*

Agronomist, Ohio Agricultural Experiment Station

ALFALFA has been the most highly advertised crop in America. For a quarter of a century, its praises have been sung in the farm press, in publications of our agricultural colleges and experiment stations, in innumerable speeches by agricultural leaders. By reputation it is the forage crop par excellence, a great crop for feed, and a great crop for the soil. Most farmers would like to grow it. Large numbers have tried growing it. But, the fact remains that today, in the three states of Ohio, Indiana, and Illinois less than 1/50 part of the cropped land is growing alfalfa whereas other hay crops make up from 1/5 to 1/3 of the total acreage.

What is the reason? Most farmers know. Alfalfa is not an easy crop to grow. Many have failed for every one who has succeeded. Alfalfa is an exacting crop. It requires good drainage, plenty of lime in the soil, and last, but by no means least, an abundant supply of mineral plant food. It is the aristocrat of the legume family —quite different indeed from its lowly cousin, sweet clover, which grows almost anywhere if enough lime is supplied.

Alfalfa has suffered because of its reputation as a soil improver. The tendency has been to seed it and then let it shift for itself. To be sure, under proper conditions, alfalfa can gather enormous quantities of free nitrogen from the air. Unfortunately it can't get its phosphoric acid and potash in the same way but is dependent on the soil, just like corn or wheat or any other crop. What's more, it needs a lot more of these mineral elements than most crops.

A three-ton crop of alfalfa hay removes from the soil nearly twice as much phosphoric acid and fully three times as much potash as the grain and stover of a 60-bushel corn crop. Many farmers, who wouldn't think of growing 3 or 4 corn crops in succession on a piece of land without liberal applications of manure or fertilizer, will sow alfalfa and mow it 3 or 4 years without any fertility treatment whatever. When the stand thins out, apparently due to winterkilling, and the grass and weeds come in, few realize that this condition is often the result of phosphate and potash starvation.

Of course there are certain types of soil and certain kinds of winters when even the thriftiest of alfalfa plants will heave out and die. On the other hand, alfalfa stands, which have not been injured by too frequent or too late cutting and which are supplied with enough phosphate and potash in available form to permit a vigorous fall growth, will stand a lot more winter punishment than stands weakened by a lack of mineral elements in the soil.

### *How and What to Apply*

How, then, shall we supply the plant food needed by the crop? First let us consider the treatment at seeding time. Most farmers are adopting the practice of spring seeding alfalfa in oats, barley, or wheat. Ordinarily oats doesn't come in for very heavy fertilizer treatment, the value of the increased grain itself being too small to pay for much fertilizer. We are finding in Ohio, however, that when seeding to alfalfa it pays to increase the application, the recommendation being from 250-300 pounds per acre

(*Turn to page* 52)

An ordinary spike-toothed harrow was used to cultivate this field of corn up to this stage of growth, without damage to the crop and with effectiveness in killing weeds.

# *Why* Cultivate?

*By E. N. Bressman*

Oregon Agricultural College

MANY reasons have been assigned to the important farm practice of cultivation. There is no doubt that many of these reasons have no basis and are misleading.

It has been said that corn cultivation warms up the soil, conserves moisture, makes plant food ready for use by the plants, improves the condition of the soil, and does many other things. On the other hand, many of the recent corn cultivation trials have shown that practically the entire value of cultivation is in the killing of weeds. The method of cultivation, therefore, should be designed to kill the most weeds at the least cost. Many methods of cultivation now being used do not do this. Particularly is this true in sections where they cultivate throughout the entire corn-growing season and cultivate when no weeds are present. In other instances, it appears that the method of cultivation is not designed to kill weeds but to stir the soil every little while throughout the entire season.

At both the Kansas and Illinois stations they find that by scraping off the weeds on the surface of the ground and not stirring the soil at all they get as good yields as when the ground is stirred thoroughly throughout the season. There have been many similar trials and all indicate that the chief value in the cultivation of corn is the killing of weeds.

There are two methods of cultivation, ridge cultivation and level cultivation. Most growers prefer the level cultivation because it does not require a deep stirring of the ground and has less liability of damage to the crop. Also, the yields are just as good if not better than where ridging is practiced. The same is true of deep

(*Turn to page* 53)

In the coast regions, the strawberry fields are filled with negro pickers.

# *The* Strawberry Season

## *By C. B. Sherman*

U. S. Department of Agriculture

THE strawberry season is growing to be a very long one as Florida and Louisiana come more heavily on the early markets and as the everbearing strawberries are used more frequently in the late summer and even early autumn. Formerly the very early berries were used only as a luxury by the well-to-do, but during some recent years market prices of Florida strawberries have been unusually low from January through March. In February and March strawberries can sometimes be bought in retail stores in Washington, usually considered a city of high prices, at 35 cents a box.

Contrary to usual beliefs and to usual rules, strawberries shipped in from a distance, out of season, are sometimes cheaper nowadays than the local berries in season; and shoppers are finding this out. Reasons for this apparent anomaly are many. As strawberries are a "labor crop," farmers do not plant large acreages unless they foresee fairly cheap labor in fairly large quantities, although the crop does not respond to changing conditions as rapidly as do most truck crops. Unemployment sometimes leads to large plantings and comparatively low prices. If the prospects are for a large crop, the opening prices rule lower whereas later disasters in strawberry areas may send prices up at about the time local berries come on the market. Then the earlier shipped-in berries may be more subject to deterioration than are the later local berries.

All of these facts are encouraging housekeepers to use strawberries over a much longer period than formerly and are thus creating a more steady demand. Development of earlier and later commercial varieties, use of fast trains, and refrigeration have all contributed to this long season.

Acreage has been steadily growing during the past three years and now reaches approximately 200,000 acres. Yield per acre varies greatly according to weather and pest conditions, but in general it is increasing. It has ranged from 1,500 to nearly 2,000 quarts during the past four years, so that the crop is now valued at about

$50,000,000. Arkansas, Missouri, and North Carolina have made greatest and most consistent increases of any states.

The straight carlot movement of strawberries from all producing sections of the United States amounts to 18,000 cars in seasons of normal production and about 19,000 cars have been shipped from the big crops. Then large quantities of strawberries, grown within hailing distance of city markets, are taken to market by wagon or motor truck. It is practically impossible to obtain accurate data regarding these shipments, but the importance of truck haulings is shown on the following figures from one area during a recent season. The equivalent of 1,140 carloads moved by truck from the peninsula of Virginia, Maryland, and Delaware, compared with 2,600 straight cars by rail, 200 carloads on l.c.l. express shipments, and 155 carloads by boat. Many strawberries are hauled from this peninsula as far north as Philadelphia, Newark, and New York and some are even hauled to Boston. Shipments have also been made by truck from North Carolina, and many Michigan berries are hauled to such markets as Chicago.

In each of the last few years, 24 leading markets have taken about 60 per cent of the total carlot shipments of strawberries. New York City usually receives more than 2,000 cars, Chicago and Boston very roughly around 1,500 cars, Pittsburgh and Philadelphia use about 500. Philadelphia and New York City receive the equivalent of 300 to 600 additional carloads by motor truck.

### *Marketing Covers Three Months*

The Federal Market News reports show that the opening of the strawberry movement in Louisiana and other states may vary from one to four weeks in different seasons, according to weather conditions, but the principal period of carlot shipments usually is concluded by the end of June. Movement begins to be heavy by April, increases rapidly during that month and May, and usually reaches its peak about June 1. These reports show that ordinarily there are two peaks, with a small depression between them. Shipments reach their first climax around mid-May, when Arkansas, Tennessee, and Virginia are active. A second and greater peak frequently occurs the first part of June, when shipments from Missouri,

**Berries are carefully packed for shipment. Somehow when the inspector is away the crates will get out of line and the premises out of order!**

Maryland, and Delaware are heavy. A sharp decrease occurs by mid-June, and only a part of the late crop moves by rail after that month. Most of the late strawberries are consumed locally and do not appear in carlot reports.

In spite of the fact that the season for strawberries is much longer than formerly, the bulk of this highly perishable crop must still be marketed within three months. This concentrated movement necessarily presents difficulties. Weather conditions at shipping and marketing ends must be considered. Cars must be ready. Prices must be watched, yet stock cannot be held over. In southern Louisiana where the crop matures so early that no competing sections are shipping in volume, the auction method of selling has been successfully developed at Hammond. During some seasons it has been estimated that about 90 per cent of the tonnage was disposed of by open competitive bidding. The remainder of the crop was handled by private selling agencies and individuals. Practically all of the shipments from the district are made in express refrigerator cars. Each day after the fruit is gathered, it is hauled to the respective loading stations, loaded in refrigerator cars, and rolled toward northern markets. In the evening, the rolling cars are sold to the highest bidder and the new owners then divert their purchases to desired destinations.

Strawberries form the favorite fruit of a very large number of people and are one of our most popular fruits, but if a good market is to be maintained for these large and growing crops, it is evident that increasing care must be given to their preparation for market. Careful picking to prevent injuring the fruit and to prevent including green berries and trash in the boxes is essential unless the berries are to be sorted and repacked. Even then care in the fields is desirable and care in sorting to prevent bruising is necessary.

Grading and careful packing are receiving much more attention than a few years ago, but the methods could be extended advantageously. The Department of Agriculture has issued specifications for standardized grades, the uses of which are being extended.

Important commercial producing sections are gradually eliminating the less desirable varieties and are concentrating attention on the varieties that are best suited to their conditions or are in greatest demand from those sections.

### *Fruit Is Inspected*

An important factor in the promotion of all of these practices designed among other purposes to put a better strawberry crop on the market is the Federal-State, shipping-point inspection service which is now available in most of the strawberry shipping sections. Upon request of the grower, shipper, receiver, or any other person who has a financial interest in any lot of fruit, an inspection is made of the contents of a car. A certificate is issued which describes in detail the quality, condition, pack, grade, load, and other important factors. This certificate is accepted as prima facie evidence in any United States court in case of a dispute; it is generally accepted as a basis of buying and selling; it is used as a basis of settlement for allowances or rejections; and in connection with insurance and the settlement of claims. The service is optional and the cost is only enough to cover the expense involved.

The inspectors usually work on the loading platform or in the car while it is being loaded. Usually a casual examination is made of every crate in each lot of strawberries delivered to the car, to note the uniformity of the lot, and a thorough examination is made of representative samples of each lot.

(*Turn to page* 50)

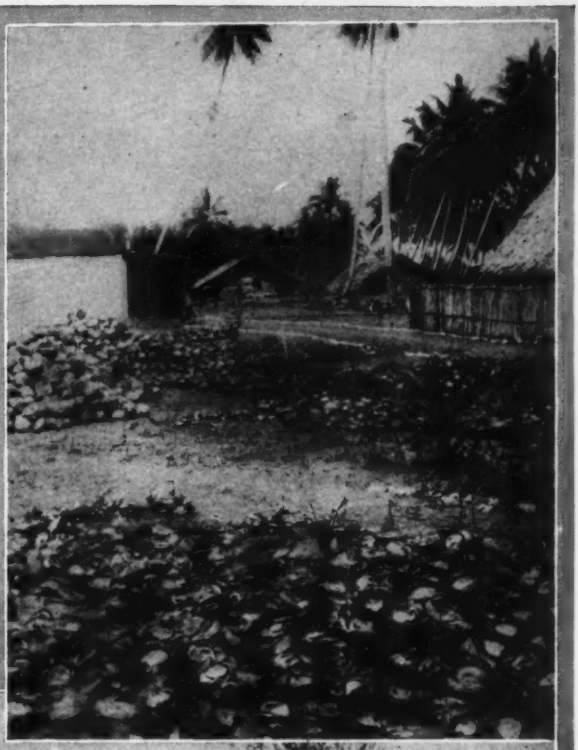
*Lovers' Lane*

# PICTORIAL

Above: These shy girls of high caste in India were photographed in a secluded garden by an American woman. They had never been photographed before because to have their faces seen by men, except the men of their own families, constitutes a disgrace to their families. Those with dark satin trousers are Hindus, and the others are Mohammedans.

Left: Hindu cows make themselves at home on the city streets in India. This picture was taken on a prominent street of Calcutta, and the cows seem as contented here as though they were in their green pastures.

**Right:** Hundreds of cocoanuts are split and dried in the sun on the Solomon Islands, in the western Pacific. The dried kernel, without having the oil pressed out, is known as copra and is one of the biggest exports from the Islands.

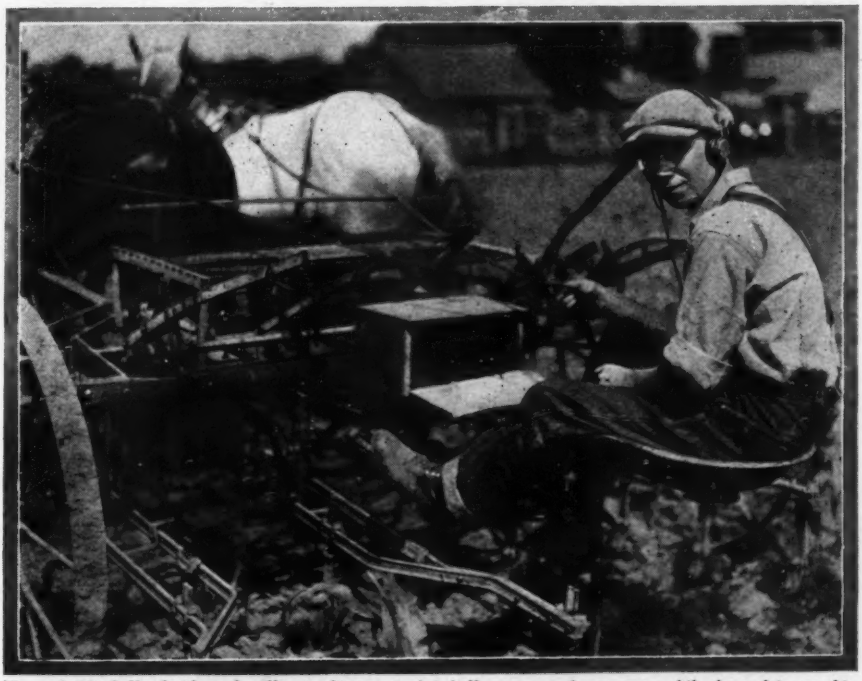


**Below:** A strange farm is this snake farm at Sao Paulo, Brazil. Serums to cure snakebites are made with the venom extracted from poisonous snakes. It has been estimated that 5,000 lives are saved annually by serum from this place. The institute keeps all of its poisonous snakes in this enclosure, and the farm is a popular attraction for tourists.

Clarence Mallory of Greenville, Georgia, had his picture taken to "illustrate" his fish story about this large-mouth black bass.

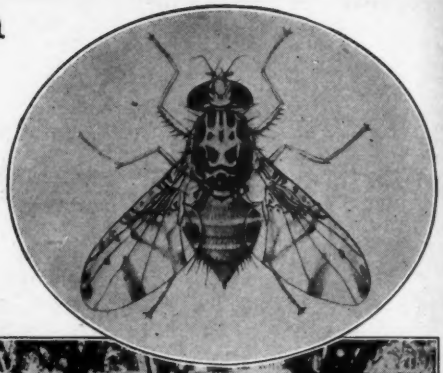
This picture was taken across Hood River Valley, Oregon, and shows one of the famous fruit sections of the great Northwest.

An old Boston and Providence Railroad coach is now one of the points of interest in the museum at Purdue University.

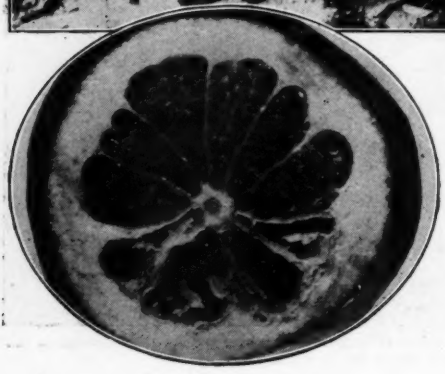


Howard Mitchell of Alworth, Illinois, listens to baseball games and concerts while he cultivates his father's corn.

# The Mediterranean FRUIT FLY



JUST as Florida was recovering from the real estate agent and floods, a new cross has fallen upon the State in the form of the Mediterranean fruit fly, one of the worst pests known to Horticulture. The insect, which is about the size and



appearance of the housefly, is causing wide concern, and Congress recently passed a special appropriation of $4,250,000 to aid in its eradication. These pictures show a male fly in the flying stage, acres of ground covered with infested fruit, and a section of a grapefruit showing damage from larvae.

# The Editors Talk

## Asking for Results

We are interested in the leading editorial in the June 1 issue of the Illinois Farmer in which the editors are asking for reports on fertilizer tests from the publication's readers. Entirely commendable is this effort on the part of this publication to give publicity to the individual work which farmers are doing to improve the soils of the state.

Because of the variety of soil types in this country, variation in rainfall, and other local factors, it is often difficult to know in advance just which fertilizer analysis will produce the most profitable crop on any particular farm. Farmers are encouraged to make their own experiments. The interest of the local press in these farm experiments is a big step toward encouraging more farmers to determine for themselves the most profitable fertilizer to use.

We are pleased to quote the editorial herewith:

FEEDING CROPS FOR PROFIT

Our check on feeds and feeding methods of livestock in Illinois is more complete than similar knowledge and information about feeding plants for profitable returns. Always we have had to feed the animals. For several generations the plants helped themselves and found plenty of everything to supply their needs. The soil of Illinois, as civilization found it, supplied pretty much a complete ration for crops. Some of the items of plant diet meanwhile have been seriously depleted in supply, hence our growing concern about soil fertility.

In 35 states farmers feed to their crops 7,500,000 tons annually of prepared plant food in the form of fertilizers, in addition to the fertility conserved from livestock production, and added from the intelligent use of legume crops. Last summer the fertilizer association representatives asked a lot of questions of nearly 50,000 farmers in these states concerning crop feeding. "Based on your experience, what increase do you expect from the use of fertilizers on your most important crops?" This was one question asked. Illinois farmers numbering 286 answered this in regard to corn. The average of their experiences showed acre yields of 32.3 bushels an acre without fertilizers, and 41.7 bushels with fertilizers. Wheat farmers, 95 in number, reported average yields of 14.3 bushels without fertilizers, 21 bushels with fertilizers. In Indiana the figures for corn, with 1,918 farmers reporting, were 34.7 and 44.5 bushels an acre respectively, and for wheat, 1,931 farmers reporting, 13.1 and 21.2 bushels respectively.

We find that numerous Illinois farmers in all sections of the state are this year testing out for themselves, with check plot and test rows, just what commercial plant food may mean to their cropping system. We should like reports from readers on results as the season advances. The relation of cost to returns is the vital factor.

## Autumn Fairs

It is not too early to begin thinking about and preparing exhibits for the agricultural fairs which will be held all over the country this fall. Long established as an important institution of the Better Agriculture of any community, commonwealth, or nation, the agricultural fair that best serves its purpose is the one which is well planned and faithfully supported by its farmers.

A county fair is one of the best breeders of interest in better seed, fertilization, and cultural practices. Added to this advantage, there is the knitting of community consciousness which has become recognized as one of the biggest factors in successful rural life. Obviously the greater the number of farmers who can be interested in the county fair, the greater will be the influence of that fair and the resultant agricultural strength of the community.

Much in the way of planning exhibits and stimulating interest among farmers can and should be done now. Many more farmers would exhibit if they were taught to watch crops during the growing season for indications of results which they could enter in the contests. A county agent can do much to stimulate interest among his farmers. His trained eye will see possibilities which most farmers miss.

The first exhibit material to be gathered are the grasses. Many farmers have good hay crops and would plan exhibits if they knew just how to save and cure samples. It is a simple matter for a county agent to get in mind what constitutes a good grass sample and look for possibilities on his visits around the county. The same holds true of the grains which come on a little later. A few hints on what to watch for as indications of promising results on the other crops may create an interest that will swell the exhibits at the fair.

And in this service there is a splendid chance for a county agent to widen his field of common ground among his farmers. To miss it, is to miss a big opportunity to insure his own personal success and the success of the agriculture of his county.

An athlete starts his training a long time before a contest. The county agent who starts his farmers early in their plans to exhibit at the fair has a good start in making his county an outstanding one.

Start your autumn fair early.

## Service

The foundation of efficiency in business is service. It is the vitalizing force behind all true progress.

In times of great stress, national or local, the significance of service is most realized. During the World War, for example, the best minds of our country impelled by a desire to serve flocked to the call of service. Almost every group, particularly social, business, and religious, answered the call willingly. What was accomplished by wholesome response to this call is now a matter of historic record.

Following the years of the World War, service which had become a national habit was quickly capitalized by business. Realizing the efficacy, intense

competition resulted in the practice of service as a means of attracting and holding the people. Today the American people not only expect service, but they demand it. The company that renders service efficiently and courteously is assured of the patronage of the discriminating people.

Noted in the house organ of a large tobacco dealer in Chicago, the following remarks on the meaning of service are significant:

"One of the best tests of our standing with our customers is their feeling about asking for advice and help when in distress.

"In such circumstances, we want our customers to think of us as our house. We ask this not because of our own protest of good will and claims of services, but because of the human touch and relationship established through years of fair and square dealings."

It is this human touch and relationship that is the vitalizing force behind all true progress. It represents the highest type of service that can be rendered in any business.

## Prescribing for Agriculture

Before me is the prescription of a noted physician. In itself it is a very simple document; but when I think of the years of study and practical experience that were required to gain this information, I have a greater respect for the prescriber.

This simple piece of paper represents the best thought of the medical world, hours of diligent and tireless study in the library as well as in the laboratory, seeking a cure for the suffering. The medicines that make up this prescription are of known purity, even to a tenth of one per cent. Each has a definite duty to perform, but the proper blending depends on the skill of the prescriber.

Notwithstanding all these years of study and practice, this doctor prescribes for a patient only after making a thorough examination. When such an examination fails to reveal the trouble, a blood analysis is resorted to. A complete health history is made to study the relation of outside influences, such as food, inherited weakness, etc. At the bottom of this prescription is written "Persistence wins and cures," which reminds the patient to carry out instructions.

Let's study for a moment the perennial prescribers for agriculture. Not infrequently they are politicians, merchants, bankers, editors, or railroad presidents who have made some measure of success. The politicians prescribe what they think will get votes and bring about reelection. Incidentally they mention that they have voted for farm relief. The merchants usually recommend that the farmers keep better records and sell their crops as merchandise is sold. Bankers tell the farmers to put their farms on a business basis, so they can tell what crops are paying. Editors advise the farmers to advertise more, while the railroad presidents tell them that the key to success lies in better distribution.

All these prescriptions have some merit, but they are given by men who have a limited knowledge of only one need of agriculture. Each insists that his plan is all that is necessary to put agriculture in a favorable position. Men

who wish their advice followed are careful about what they advise. So it should be with prescribers. Prescriptions, regardless of their source of origin, are valuable in proportion to the relief and cure they bring. Wise is the prescriber who studies before he offers cures.

The most practical prescription for agriculture should arise within the ranks of the farmers. Men trained in agriculture and in addition having a wide experience in growing and marketing farm crops should have the necessary information on which to work a prescription for agriculture that will result in its betterment.

## Soil Improvement Contests

The Soil Improvement Committee of the National Fertilizer Association is announcing its sixth contest of soil-building programs in the northern and northeastern states. We are glad to see this announcement and hope that all of our county agent readers will familiarize themselves with the terms of the contest.

One of the most important problems in any county is the maintenance and improvement of the fertility of the soil. Even though a county agent may not be able to size up the problem sufficiently to have a clear and definite program, he will be interested in getting suggestions from the programs which will receive publicity as a result of this contest. On the other hand many county agents, after reading the rules in the announcement may be able to work out a program that will receive recognition.

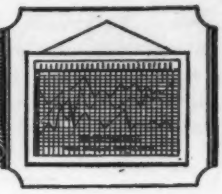
Because of the great diversity of conditions in the various states included in the territory covered by the contest, the committee leaves the *organization of the County Soil Improvement Program entirely to the judgment, individual initiative, originality, and organizing ability of the agents themselves, working with the extension forces of their respective states.*

Eight awards will be made to eight county agents, two from each of the four districts into which the northern states have been divided. The judging will be done on the basis of analysis of the soil problem, the program of work adopted, the methods used, and the results of the campaign. The judges for this year's contest will be E. S. Bayard, editor-in-chief of the Ohio Farmer and the Pennsylvania Farmer, chairman; Dr. F. J. Alway, chief in soils, University of Minnesota; R. J. Baldwin, director of extension, Michigan State College; Dr. R. J. Garber, agronomist at the University of West Virginia; and Dr. E. Van Alstine, agronomy specialist, University of Vermont.

The prizes will consist of educational trips to the annual meetings of the American Society of Agronomy in Chicago in November as guests of the Soil Improvement Committee.

For full details of the rules of the contest, it is suggested that interested county agents get in touch with Mr. H. R. Smalley, Director of the Soil Improvement Committee, National Fertilizer Association, 616 Investment Building, Washington, D. C.

# AGRICULTURAL DEVELOPMENTS



*By* P. M. Farmer

## PICKING YOUNG PULLETS AND ROOSTERS

Some Wisconsin hatcherymen have devised a plan whereby they can sort the potential roosters from the prospective pullets the day they are hatched. The secret is in crossing certain breeds as experimental breeders have been practising it for some time. The most popular method consists in crossing Barred Plymouth Rock hens with Rhode Island Red or Brown Leghorn males. As soon as they are hatched the distinctive marks are evident. The females are black while the cockerels are black with white spots on the backs of their heads and on the wings. When these birds mature the cockerels will be dingy barred and the pullets will be black with some red. Silver Wyandotte females crossed with Buff Leghorns, Buff Orpingtons, or Buff Rocks produce cockerels of a very light color while the pullets are very much darker. By this method it is possible to buy chicks and get 100 per cent pullets.

## WILL STOP THE GULLIES

The war against erosion will fill up all the trenches cut by uncontrolled rain-water in a—well, not by Christmas, but in a period of years. Dr. A. G. McCall, Chief of Soil Investigations of the Bureau of Chemistry and Soils, chairman of the special committee appointed to deal with the erosion problem, has announced plans which will be put into operation with the $160,000 recently appropriated by Congress for the use of the Bureau of Chemistry and Soils, the Bureau of Public Roads, and the Forest Service. Forty thousand dollars which become immediately available for this campaign against the gully-washer will be used in the establishment of regional erosion stations. The first seven of these stations will be placed in the red land regions of Oklahoma and Texas; the gray lands of northern Missouri and southern Iowa; the black lands of central Texas; the light colored sandy lands of southwest Arkansas, northeastern Louisiana and east central Texas; the southern Piedmont lands of Virginia, North Carolina, South Carolina and Georgia; the northern Piedmont lands of New Jersey and Pennsylvania; and the dark prairie lands of west central Kansas. As funds permit additional stations will be located in other areas where erosion is bad. At these stations studies will be made of terraces, soil-saving dams, under drains, and cultural methods. Laboratory studies will be made of the physical and chemical properties of various soil types with relation to erosion and the erosion reconnaissance of the United States will be completed.

## TEST COWS BY MAIL

Robert Amundson, county agent of Outagamie county, Wisconsin, says it is highly important to know what kind of cows there are in the barn, since 80,000 milk cows are sold out of the State each year and the farmer doesn't want to get rid of his best

ones. Amundson is father of the "mail order" method of testing cows. Every year now 4,000 cows, 1/5 of all the cattle in the county, get a production test by the mail order method.

## YOUTH RULES SUPREME

It won't be long now before the 4-H club boys and girls will be running the country, and after all perhaps that was the idea when the movement was started—that they would be taught to know their business so well that everybody else would follow them. There are now, according to reports of the Department of Agriculture, more than 666,000 members of these head, heart, health, and hand clubs.

## FISH OR CUT BAIT

Potato raisers in Ohio are building up more and more competition for each other and it now looks as if the ordinary spud raiser who gets less than 150 bushels to the acre will have to do as his successful neighbors are doing or quit the spud game. E. B. Tussing of Ohio State University says the average cost of producing an acre of potatoes in the State is about $150, which includes grading and marketing. At 70 cents a bushel the grower of a 200 bushel crop wouldn't break even. With prospects of a large crop and low price, high acre yields are the only salvation to those who grew potatoes as a cash crop.

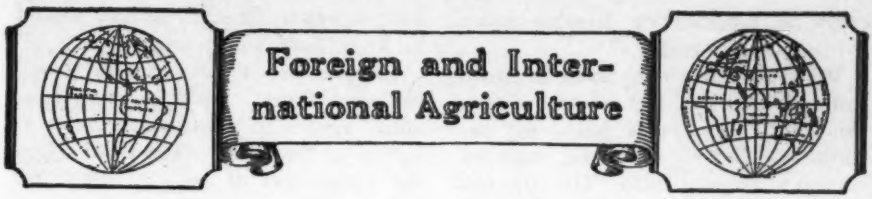
## RED PAINT IS ALL WET

"Must a barn be red?" asks the Department of Applied Art at Kansas State Agricultural College. And then it answers the question by recommending that "angry" red paint be supplanted by softer hues. A red barn, say these art advisers to the farmer, doesn't merge into nature's landscape as all buildings should. Here are some guides to help the farmer who feels like becoming color conscious: Tan colored Jerseys, Ayrshires, or Guernseys show off to best advantage with a background of harmonizing tan buildings trimmed in a darker or lighter shade. White barns for black and white Holsteins. (This would probably go all right with Hampshire, Poland China, and Berkshire pigs and Dutch Belted cattle.) In general, the art advisers suggest, a buff color scheme with buff Orpington chickens, reddish pigs, a golden-haired Collie and a nice orange cat. Or a striking black and white effect wherein white buildings shelter a flock of Barred Plymouth Rock hens or Black Minorcas, dappled gray horses, a striped tabby cat, and a black and white terrier.

## WHAT! NO ODOR!

Floriculturists have changed some flowers almost beyond recognition, and now it seems that certain horticulturists have a desire to turn many well-established vegetables into something that would make old timers turn up their noses and call them dude stuff. W. A. Huelsen of the University of Illinois expresses hope that the miracle of an odorless onion may come out of research now in progress. (Wouldn't a lot of the onion's charm be gone?) To support his contention that the onion may be greatly "improved," he cites what has happened to many sedate old vegetables: Green and wax beans now grow without strings; melons have been standardized; some pickles have lost their warts; tomatoes and bananas are ripened with ethylene gas and celery is rapidly blanched with the same stuff; we have vegetables, once sad weaklings, now resistant to all sorts of diseases.

Nowadays, if a man falls by the wayside, the chances are that he was a pedestrian.—*Life.*




# Plowing in India

*By J. J. De Valois*

Agricultural Missionary, Katpadi, South India

WHEN the American farmer hitches his tractor to a three or five-bottom plow, the personal equation is largely reduced to that of mechanical skill. By adjusting a lever here, setting a bolt or a slide there, an expert can so regulate a plow as to almost guarantee a clean, smooth, uniform furrow. Such a job is very largely "machine made."

In the old days when the homesteader hitched "Nance and Charlie" to the breaking plow and cut a straight black furrow through the untouched prairies, it took more than mechanical skill to plow a straight, uniform furrow. It doubtless was a hard, monotonous grind to follow the walking plow day after day. A 40-acre field could not be turned over between sunrise and sunset. But what pride those early pioneers took in their plowed fields! How they put their personality into every ridge and furrow!

Of course no one would be bold enough to advocate a reversion to "Nance and Charlie" and the walking plow. Progress does not come that way. But still I do not wonder that some of the grey-headed veterans delight in reminiscence of days past.

In India, however, the plow that is still almost universally used is a wooden stick with a small steel covered point. Therefore, when we speak of improved plows in India, we are thinking of a tool quite comparable to the two-horse walking plow discarded by most American farmers several years ago. An aged pioneer of the West today must go to a museum to find his old friend the walking plow. If he would come out to India he could sing its praises to his heart's content and do a real service to his Oriental farming brother at the same time.

### *Still a Novelty*

The single-bottom plow is still a novelty and an unseen, unheard of modern improvement to thousands of farmers in India. Plowing is such a fundamental operation in any agricultural practice that the introduction of a real plow is one of the first considerations that is engaging the attention of those of us interested in better farming for India.

The wooden stick used for a plow in India is really a misnomer. It does not invert the soil, it merely loosens it up a bit as does a harrow or cultivator. However, it is the only tool which millions of people have known for centuries. It has been handed down from generation to generation. Under primitive conditions it has been the best that could be used no doubt. Even today India has no blacksmiths or repair men that could put and keep a modern plow in condition. The wooden stick can be made with very little trouble and when worn out can

easily be replaced by dressing down the branch of a tree.

When the early rains come in South India by June 15, the peasants mobilize every animal that bears any resemblance to the cow, the beast of burden in tropical India. The cow and her family are indispensable; I do not wonder they have for ages been considered sacred. The draft bullock, the buffalo, the milk cow, young heifers, and bull calves, anything that is at all capable of dragging the wooden stick, are put to work as soon as the first cooling shower has broken the long summer of heat and drought. They must need be on the job early because the ground soon dries up making it impossible to get in the crops of peanuts, Kaffir-corn, sorghum, and millets.

### *Experience Is Best Teacher*

Over the ground the Indian farmers go lengthwise, crosswise, diagonally and at right angles five or six times to get the land in that condition of tilth that a real plow would do in one operation. "What a pity that after the previous crop was harvested these fields were not plowed up and allowed to lie fallow and conserve moisture," say the Westerners. But the Indian peasant has never had access to an agricultural college, experiment station, or extension staff, so how should he know how to do any better?

Farmers are a conservative group the world over. "We are from Missouri" applies to the Indian peasant as well as to the American farmer. When the advantages of an iron plow are mentioned, ever so many objections are forthcoming. "Our bulls are too small to pull such a heavy plow." "Our cattle are not accustomed to it." "The price is too much, we can't afford it." "Who will keep it in repair for me?" All these objections have to be met and rightly so. An Indian farmer's income is too small to gamble on an experiment.

We have found that one of the best ways to convince the Indian peasant is to give him a chance to try and work one of these plows himself. "An ounce of practice is worth a ton of theory." With this we try to link the personal equation, namely, pride in being able to do a certain thing better than the next fellow does it. Plowing competitions conducted at large festivals and fairs are our best preachers. Give a man a chance to operate one of these mysterious iron plows with his own pair of bullocks before a large crowd of curious, if not interested spectators, praise him a bit for his excellent plowing, and give

(*Turn to page 55*)

**The parts of the plow which this Indian coolie is using are the same as in the American walking-plow, but the handle is adapted so that the coolie may have a hand free to twist the tails of his bullocks.**

# REVIEWS

**This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Soils, Fertilizers, Economics, Crops, Crop Diseases, and Insects. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.**

## Fertilizers

"The Report of the Proceedings of the Eleventh Annual Convention of the Michigan Muck Farmers Ass'n." contains many interesting and instructive papers which were presented to the muck farmers in that state at their 1929 get-together. Of special interest are several papers by Dr. P. M. Harmer on past and present methods of efficient muck management and on the use of fertilizers to secure the most efficient results in order to produce the highest quality crops.

Apparently among the most important factors in the successful farming of muck soils are proper drainage, the use of crops and varieties well adapted to this type of soil, proper cultural methods, and the use of necessary lime and fertilizers. The use of lime depends on the acidity of the muck, while the fertilizer depends to large extent on the crop to be grown. In general, fertilizers containing little or no nitrogen, moderate amounts of phosphoric acid, and large amounts of potash have proved to be most profitable on muck soils.

*"Inspection of Agricultural Lime Products," Agr. Exp. Sta., Amherst, Mass., Bul. 46, Dec., 1928, (Control Series), H. D. Haskins and M. W. Goodwin.*

*"Michigan Fertilizer Bulletin," State Dept. of Agr., Lansing, Mich., Bul. 54.*

## Crops

With New England dairymen taking more and more interest in the possibilities of raising their own feed, the new bulletin 182, "Alfalfa in Maine," by A. K. Gardner, crops specialist of the Maine Agricultural Experiment Station, is both timely and valuable. In his well-illustrated treatise, Mr. Gardner points out that there is no reason why this crop cannot be grown successfully in New England if conditions are favorable. Along with his recommendations on other cultural practices, seeding, harvesting, and curing the crop, he emphasizes the necessity of soil well supplied with the plant food on which this crop draws heavily. From experiments it appears that potash and phosphoric acid are the elements most commonly needed to supplement the available soil supply of plant food in the soils of this state.

We again find recommendations on fertilizing alfalfa in the results of experimental work recently released in the "Forty-seventh Annual Report" of the Ohio Agricultural Experiment Station, Bulletin 431. Here a marked response of alfalfa to fertilizers high in potash used as a top-dressing is noted. The report is a very concise and understandable summary of the work which this well-known experiment station is doing along all lines for improving farm practices.

"Field Peas in Wisconsin" is the title of a new bulletin, No. 408, by E. J. Delwiche of the Wisconsin Agricultural Experiment Station. Exceptionally well illustrated, this publication is a good guide for the grower of this profitable crop and contains information which should not limit its range of interest to the growers within the Badger state alone.

*"Elements of Grape Growing in California," Agr. Ext. Serv., Berkeley, Cal., Cir. 30, Mch., 1929, Frederic T. Bioletti.*

*"Monthly Bulletin of the Department of Agriculture," Sacramento, Cal., Vol. XVIII, No. 3, Mch., 1929.*

*"The Home Vegetable Garden," Agr. Ext. Serv., Berkeley, Cal., Cir. 26, Feb., 1929, H. A. Jones.*

*"Report of the Agricultural Experiment Station," Berkeley, Cal., July 1, 1927, to June 30, 1928.*

*"Seed Inspection," Agr. Exp. Sta., Amherst, Mass., Bul. 47, Feb., 1929, (Control Series), Philip H. Smith, Elizabeth F. Hopkins, Oliver W. Kelly, Clarice L. Beane.*

*"American Potato Journal," The Potato Assn. of America, East Lansing, Mich., Vol. VI, No. 4, April, 1929.*

*"Tillage Practices in Relation to Corn Production," Agr. Exp. Sta., Lincoln, Nebr., Bul. 232, Dec., 1928, T. A. Kisselbach, Arthur Anderson, W. E. Lyness.*

*"High-Nicotine Tobacco," Agr. Exp. Sta., Geneva, N. Y., Bul. 562, Jan., 1929, R. C. Collison, J. D. Harlan, L. R. Streeter.*

*"The Quality of Packet Vegetable Seed on Sale in New York in 1926, 1927, and 1928," Agr. Exp. Sta., Geneva, N. Y., Bul. 565, Mch., 1929, M. T. Munn, Olive M. Hoefle, Mary E. Woodbridge.*

*"Pollination Study of the Anjou Pear in Hood River Valley," Agr. Exp. Sta., Corvallis, Ore., Sta. Bul. 239, Mch., 1929, Gordon G. Brown and Leroy Childs.*

*"Abstracts of Bulletins 366-392 and Circulars 48-52," Agr. Exp. Sta., College Station, Tex., Cir. 54, Dec., 1928, A. D. Jackson.*

*Department of Agriculture Immigration of Virginia, Richmond, Va., Bul. 256 and 257, April and May, 1929.*

## Economics

Rapid changes have taken place in the farming of the Great Plains regions in recent years. The introduction of improved power machinery and better varieties of crops have been important factors in causing these changes. In a new circular 142, the Kansas Agricultural Experiment Station discusses "The Effect of the Combined Harvester-Thresher on Farm Organization in Southwestern Kansas and Northwestern Oklahoma." The purpose of the authors, W. E. Grimes, R. S. Kifer, and J. A. Hodges, was to bring together information concerning past experiences, present conditions, and probable future trends that will be most helpful in adjustment to the changed and changing conditions. The publication ably fulfills the purpose in mind.

The cycle and prices of beef cattle have a marked effect on returns in the cattle industry. This is strikingly brought out in Bulletin 231, "Economic Aspects of the Cattle Industry of the Nebraska Sand Hills," by Harold Hedges of the Nebraska Agricultural Experiment Station. The study is based upon the records of 47 ranches for a period of three years, 1924-5 to 1926-7. For the year 1924-5, the average rate of return on the operators' equity was 0.5 per cent; in 1925-6, it was 8.8 per cent; and in 1926-7, it was 5.4 per cent. The year 1924-5 was a very poor year, while the other two were much better. These changes in net return were due in large part to the change in cattle prices. The average indebtedness per ranch was $25,104 in 1926-7. The availability of credit and the rate at which it can be obtained are important in ranching operations in this territory.

*"The Use of Time in Farm Homes," Agr. Exp. Sta., Lincoln, Neb., Bul. 230, Dec., 1928, J. O. Rankin.*

## Diseases

Several important new publications on plant diseases have come into circulation during the past month. In one of these in particular, we find reference to the use of plant food in connection with disease control. Bulletin 432, "Ohio Potato Diseases," by Paul E. Tilford of the Ohio Experiment Station in this connection cites the effect of potash deficiency on the potato plant: "The upper surface of the leaflets is bronze colored. The tissue between the veins bulges upward and the leaflet margins curl downward. In this stage of development the trouble might be mistaken for hopperburn."

*"Powdery Mildew of the Grape and Its Control in California," Agr. Exp. Sta., Berkeley, Cal., Cir. 31, Mch., 1929, H. E. Jacob.*

*"Curly Top Symptoms in the Sugar Beet," Agr. Exp. Sta., Berkeley, Cal., Bul. 465, Mch., 1929, Henry H. P. Severin.*

*"Spraying Tree Fruits," Agr. Exp. Sta., Lincoln, Neb., Cir. 36, Mch., 1928, C. C. Wiggans and E. H. Hoppert.*

*"A Chemical Control for Sweet Potato Wilt or Stem Rot," Agr. Exp. Sta., Raleigh, N. C., Tech. Bul. 35, Mch., 1929, R. F. Poole and J. W. Woodside.*

*"Potato Seed Treatment Experiments on Long Island with Special Reference to the Organic Mercury Instant Dips," Agr. Exp. Sta., Geneva, N. Y., Bul. 564, Feb., 1929, E. E. Clayton.*

*"Relation of Cotton Root Rot and Fusarium Wilt to the Acidity and Alkalinity of the Soil," Agr. Exp. Sta., College Station, Tex., Bul. 389, Nov., 1928, J. J. Taubenhaus, Walter N. Ezekiel, and D. T. Killough.*

**Insects**

*"Termites and Termite Damage," Agr. Exp. Sta., Berkeley, Cal., Cir. 314, Apr., 1928, S. F. Light.*

*"Apple Pests in Massachusetts," Agr. Exp. Serv., Amherst, Mass., Ext. Leaflet 131, Jan., 1929, A. I. Bourne, W. L. Doran, W. H Thies.*

*"The Nematode Disease of Sweet Potatoes," Agr. Exp. Sta., Raleigh, N. C., Bul. 265, Apr., 1929, R. F. Poole and Robert Schmidt.*

---

# Industry Presses Onward

(*From page* 18)

agricultural and urban industries. It also influences industry in two fields of activity—production and utilization. If any clear definition of the principles or problems involved is to be gained, these distinctions are essential.

Agricultural industries are, of course, those that supply the farmer or depend chiefly on the farmer for their sales volume, such as companies supplying fertilizer, lime, machinery, equipment, etc. It is true that the farmer buys everything that the city man buys, but a distinction between urban and agricultural industry is necessary because the state has a vital interest in what happens in agriculture, since the greatest of all of our natural resources, the soil, is involved. The state maintains colleges and experiment stations to help the farmer. The state defines certain controls regarding the conditions of sale of many commodities sold to the farmer. Thus, there is both a stimulus and control in connection with agricultural business that does not exist to the same extent in urban business. It is highly important to recognize this distinction between these two broad classes of industry if we are to understand with any degree of clarity the work and organization of an agricultural business and the functions of technical men in that business.

### *Utilization—The New Problem*

Again, there is another equally vital distinction to be made in the effects of science in industry, namely, the distinction between production and utilization. In the past, science has been concerned chiefly with production. The problem has been how to produce goods cheaply; how to standardize; how to produce new products in large volume; to increase the efficiency of labor and by so doing to decrease the number of workers and increase the output per man. According to Holland, the effect has been to take the "time lag" out of production. The chief purpose in research is to reduce this "time lag" from basic invention to full scale application. It has been shown that this cycle has been completed in the case of several modern industries in less than 50 years.

So effectively has research influenced production that a new problem was inevitable, the problem of the scientific utilization of the products of industry. As the "time lag" is fast being taken

out of the production of the products of industry, so is there growing a more intense effort to take the "time lag" out of the utilization of the products of industry. In other words, a balance of production capacities by a larger and yet socially acceptable utilization is one of the chief problems of the present day. It is reasonable to expect that in the next decade, while scientific work will still be vital in the field of production, the influence of science will be more pronounced in the field of utilization.

If this hypothesis is true, a survey of present industrial activities should show a growing tendency to organize in this field of scientific utilization. This seems to be the case. For instance, the leather industry is supporting special research to discover new uses for leather; the gas industry is finding new uses for gas in competition with electricity, especially as applied to refrigeration. Research work in the cement industry largely centers around new ways to use cement. Many of the agricultural industries that produce fruit and foods are more concerned with the utilization of the products than they are with the production—hence trade names and advertising campaigns. New uses are being found for paper as a means of mulching. In fact, so strong is growing the emphasis on scientific utilization that the question as to whether the products of the farmer cannot be utilized in a greater variety of ways arises in organized meetings. Forces are tending to shift the emphasis of the scientific work of the agricultural experiment stations from crop production to crop utilization.

What is the social significance of this growing emphasis of science and what is the business man's share of this burden? This question has been ably discussed by Wallace B. Donham.[1] He says:

"The social responsibility imposed on the business man of today is a logical outgrowth of the developments of science which so largely affect not only the economic and material things in our lives, but our whole attitude of mind."

Therefore, as the writer continues to point out:

"The creative scientists have lost control of the consequences of their thinking and have placed a heavy burden of responsibility on other groups. This burden is the heavier because nothing in the hundreds of thousands of years that the human race has been developing prepares it for rapid changes and environment; all the practical developments of scientific thinking, including power, machinery, and factories, railroads and automobiles, the fast mail, telegraph, and wireless, have revolutionized both our intellectual and material environment within a few decades."

### *Responsibility Falls on Business*

In a few words, the scientist has taught the world to change its methods of production. He is now confronted with the fruits of his own labor, to show Man how to scientifically use what he has scientifically produced. He is asked to do this for Man's social good in socially acceptable ways.

At present the practical application of this burden falls largely on the business man. He controls manufacturing, transportation, and finance. His problems are becoming more complex; he is dealing with fundamental changes in industry that in all probability will continue to increase in intensity and in the breadth of their application.

Sound principles are needed if the growing forces influencing industry are to be turned to socially productive ways for the ultimate good of industry, the farmer, and society.

[1] Donham, Wallace B. Harvard Business Review, Vol. V, No. 4, July, 1927.

Pages From A Field Note Book

# Kentucky Tobacco Tests

*By W. H. Scherffius*

A PROGRESS report has just been issued by the Kentucky Experiment Station, giving interesting results of experiments conducted on the various experimental fields located in different parts of the State.

***Greenville, Kentucky:*** In a crop rotation, including tobacco, with various fertilizer treatments running through 12 crops, the fertilizer treatments without potash gave an average of 831 pounds of tobacco per acre, whereas the treatments containing potassium gave 957 pounds of tobacco per acre. This increase of 126 pounds of tobacco can be attributed to the addition of potash.

***Mayfield, Kentucky:*** In a crop rotation, including tobacco, with various fertilizer treatments running through 12 crops, the fertilizer treatments without potash averaged 916 pounds to the acre, whereas the treatments containing potash averaged 1,003 pounds of tobacco to the acre. An increase of 87 pounds of tobacco to the acre was obtained by the addition of potash.

***Campbellsville, Kentucky:*** In a crop rotation, including tobacco, fertilizer treatments, consisting of limestone, superphosphates, rock-phosphates, and manure, were conducted over a period of five years. Last season the tobacco plots were split and in addition to the regular treatments, one half was given 100 pounds of muriate of potash. The potash additional to superphosphates increased the yield of tobacco 240 pounds and additional to superphosphates on limed ground gave an increased yield of 160 pounds of tobacco to the acre. In another experiment consisting of a four-year rotation, the tobacco plots were split during 1928 and one portion received potash, 100 pounds to the acre in addition to the lime and superphosphates, and another portion received 100 pounds of muriate of potash and 200 pounds of nitrate of soda to the acre in addition to the superphosphates and lime. The average increase for the potash addition was 119 pounds of tobacco to the acre, and for both the potash and nitrogen the increase was 286 pounds of tobacco to the acre.

***Princeton, Kentucky:*** At the Princeton substation, fertilizer-tobacco experiments conducted for the years of 1927-8, using various analyses, showed that on the average it is profitable to use potash on tobacco soils in that area. In fact, generally speaking, those plots treated with all three of the essential plant foods gave the best results. Those plots containing nitrogen and superphosphates but no potash averaged 976 pounds of tobacco to the acre; those with potash averaged 1,055 pounds of tobacco to the acre, thus showing 79 pounds of tobacco more to the acre by using

potash. An average of all of the plots, containing all three of the plant food elements (not including manure), was 1,130 pounds of tobacco to the acre.

All of the above results indicate that to obtain maximum yields and maximum profits it is necessary that tobacco be given liberal applications of high-grade, well-balanced, complete fertilizers.

For the production of Burley tobacco giving yield, color, and quality, there should be a preponderance of potash over nitrogen in the fertilizer analysis such as a 3-8-6, 4-8-8, or 6-8-10 (nitrogen-phosphorus-potash). In the case of Dark or Cigar tobacco, the nitrogen and potash should approach a 1-1 ratio, as for example a 4-8-4 or 6-8-6 (nitrogen-phosphorus-potash).

# The Strawberry Season

(*From page* 30)

The main factors considered by inspectors are size, degree of ripeness, cleanliness, and the proper filling of the crates. The degree of ripeness at which strawberries are accepted for shipment in carload lots depends upon the period of the shipping season and the weather which prevails at picking time. During cool, dry weather, berries may be accepted in riper condition than during hot damp weather.

Shippers are learning much from these inspectors. After watching the inspectors at work, they often begin to improve their methods of preparing strawberries for market and begin to keep a larger proportion of the poor berries at home, thus saving space in cars and cost of shipping, relieving the markets of the depressing effects of the presence of poor stock, and aiding in providing better berries to consumers everywhere.

The method of loading the cars is important as vitally affecting the condition in which the berries reach the market after being certified at shipping point. After the car is properly loaded, it is imperative that the load be braced securely, particularly if space is left vacant at the doorways. In such cases center bracing is used, until the entire load is made tight. Examination of cars at market terminals shows that considerable damage in transit is incurred through inadequate or carelessly installed bracing. Inadequate bracing to save the expense of lumber is doubtful economy, for poor bracing and resultant breakage, bruising, and waste may undo practically all of the work of the grower in producing and packing a good crop and may cause a great difference between condition of berries when inspected at shipping point and when inspected at market.

# Cotton Wilt Control

(*From page* 7)

From the results the work of this particular season where these fertilizer treatments had been followed for a period of five years it appears that where no or little potash was used the per cent of wilted plants was greater and the yields of cotton were comparatively small. The quality of cotton from this plot was relatively poor, since the bolls were smaller, failed to develop normally, did not open fluffy and wide, and consequently were harder to pick. On the other hand where balanced fertilizer was used, that is, one containing ample phosphoric acid, nitrogen, and potash, as in Plots 3, 4, 6, and 7, wilt was re-

duced in some of these at least to a minimum, the cotton yields were larger, and a better quality product was obtained.

To develop normally, to resist such diseases as wilt and overcome physiological disturbances during growth processes such as may be indicated by the appearance of "rust," and to mature a bountiful, profitable quality crop, the cotton plant must be given an environment and fed liberally with a well-balanced ration, one containing phosphoric acid, nitrogen, and potash. With these elements supplied, it will develop the resistance necessary to overcome unfavorable conditions during the growing season.

While other factors have a bearing upon the prevalence of wilt, undoubtedly the most important among those which the farmer can control is the use of those varieties of cotton that are naturally more resistant, and the application of a well-balanced plant food.

---

# Spraying Potatoes

(*From page* 15)

of the leaves. They sometimes are so plentiful that they fly up in clouds when disturbed. A quiet examination of the under sides of potato leaves will reveal these tiny insects. They are greenish in color, and are about an eighth of an inch long. They are so active that the slightest disturbance usually causes them to hop away.

The potato grower should be ready to spray for these insects as soon as they appear. Repeated applications at weekly intervals for at least five times is a safe rule. Pressure is necessary to do a real spray job. From 300 to 400 pounds pressure on the spray is needed to break the bordeaux mixture into a driving mist which can penetrate the rough leaf surfaces and really cover the leaves on the under sides as well as the upper surfaces. Low pressure sprayers are very inefficient and in some cases are a waste of time and money.

Every year several samples of flea-beetle injury are sent in for identification. When the leaf is held up to the light it resembles a sieve because there are so many fine small round holes in it.

The insects are usually waiting on the field for the first appearance of the potato leaves. Control depends upon how early the sprays are applied. The safest way is to spray as soon as the potatoes are through the ground. Two pounds of dry arsenate of lead added to each 50 gallons of bordeaux will make the spray control more effective. Pressure is needed here also for the best place to have the arsenic and the bordeaux is on the under sides of the leaves.

Early and late blight foliage diseases are controlled by bordeaux if it is applied correctly. Pressure is the main item in control of these diseases also. The first spray should be put on when the plants are 8 to 10 inches high and repeated every week to 10 days until 4 to 5 applications are made.

Considering the time of applying sprays as a whole greatly simplifies the matter. The grower who begins spraying at the time the rows are first visible and who repeats the operation every seven days as long as the foliage remains green is on the right track.

The bordeaux is made by mixing together 8 gallons of copper sulfate stock solution (containing 8 pounds of copper sulfate or bluestone), 12 gallons of hydrated lime stock solution (containing 12 pounds of special spray lime), and enough water to make 100 gallons of the completed spray.

There is now on the market a special

spray lime which contains a high per cent of calcium oxide and which is so fine that it passes through a 325-mesh screen. Such a lime is far better than the kind usually purchased at a lumber yard and which is made for the building trade. This spray lime is free from sand and grit and is not as wearing on the spray pumps of the ordinary kind. When hydrated lime is used, the grower can well afford to order this special lime.

During the heat of the summer, it is desirable to add a little extra lime to secure a greater shading effect. Four to five pounds of additional lime might be added to each 100 gallons of spray.

The possibilities of spraying potatoes are so great that a real potato grower cannot afford to neglect such work. In this section of the country where a yield of 300 bushels per acre is needed to insure the financial success of the business, the growers find it profitable. At a cost of $10 for six applications, the average increased returns have been about 60 bushels per acre.

# Fertilize Your Alfalfa

(*From page 26*)

of an 0-14-6 on all but the thinnest soils where a 2-12-6 is a better choice. For wheat, when alfalfa is to be seeded, applications of 250-300 pounds of an 0-14-6 on the darker colored soils and 300-400 pounds of a 2-14-4 on the lighter colored soils are suggested. Barley responds better to nitrogen at seeding time than either oats or wheat. When seeding to alfalfa, around 250 pounds per acre of a 2-14-4 are recommended for dark colored soils and 300-350 pounds of a 4-12-4 for light colored soils.

If the nurse crop receives a liberal fertilizer application, it ordinarily should not be necessary to apply any fertilizer to the alfalfa itself during the first year of harvest. If mowed more than the one year, then, moderate amounts of fertilizer applied as yearly top-dressings on the alfalfa may be expected to materially increase the yield of hay and lengthen the life of the stand. On the Experiment Station farm at Wooster we follow the practice of top-dressing the alfalfa immediately after removing the first cutting, putting the fertilizer on through the fertilizer attachment of a common grain drill.

For top-dressing alfalfa the fertilizer ordinarily should be a mixture containing both phosphoric acid and potash. In a three-year test on the Experiment Station farm at Wooster, a fertilizer containing equal amounts of these two constituents, as an 0-12-12, has been considerably more profitable than an 0-14-4 carrying the same amount of phosphoric acid per acre. In this experiment one-half of the land was in Grimm, the other half in common alfalfa, both seeded in the summer of 1925. The soil was a well-drained silt loam, well supplied with lime, and in a fairly high state of fertility, having had liberal applications of manure and fertilizer in the past.

### *When to Top-dress*

Three hundred pounds of a 2-12-2 fertilizer per acre were applied just before seeding the alfalfa. Two top-dressings were made, one after the first cutting in 1926 and the second after the first cutting of 1927. These were made in such a way as to cross the two alfalfa varieties. Altogether there were 12 separate plots for each fertilizer treatment given, six of each variety. For the 0-14-4 the rate of each treatment was 300 pounds per acre. The amounts of straight superphosphate and 0-12-12 applied were adjusted to give the same amount of phosphoric acid per acre.

Three cuttings were made in 1926, three in 1927 and three in 1928. For the three cuttings made after the first top-dressing in 1926 and before the second top-dressing in 1927, the yield was increased eight per cent by the 300 pounds of 0-14-4 and 11 per cent by the corresponding application of 0-12-12. These rather small increases indicated that the fertilizer treatment made at seeding time was nearly sufficient to meet the needs of the crop during the first year of harvest.

For the next three cuttings, following the top-dressing in 1927, there was an increase of 16 per cent for the 0-14-4 and of 32 per cent for the 0-12-12. For the last two cuttings in the third and last year of the test, even though the top-dressing was omitted that year, the increase was 37 per cent for the 0-14-4 and 48 per cent for the 0-12-12.

Two rather important conclusions can be drawn from this experiment. First, although the 0-14-4 more than paid for itself, increasing the potash in the mixture to an 0-12-12 gave a much larger net return. Second, the older the stand the greater was the difference between the fertilized and unfertilized plots and the larger was the profit from top-dressing. In fact, after mowing three years the unfertilized alfalfa had become so reduced in stand and so infested with weeds that it was necessary to discontinue the experiment. On the other hand the plots that had received the 0-12-12 top-dressings still showed good stands with few weeds. In other words, the fertilizer treatment was effective in materially lengthening the life of the crop.

It is my opinion, based upon the results of this and similar experiments and upon the experience of alfalfa growers in Ohio, that after one year's mowing yearly top-dressings of from 200 to 300 pounds per acre of an 0-12-12 or similar analysis are apt to return an excellent profit on the investment.

I wish to point out, however, that the recommendations given are based on our Ohio experience. Variations in soil and climate often have an influence on the returns from fertilizers. Farmers in other states should consult their own soils and crop specialists before adopting the suggestions I have given.

# Why Cultivate

(*From page 27*)

and shallow cultivation. In most cases the shallow cultivation is preferable because there is less damage to the growing crop. In sections where deep cultivation is practiced, it is not an uncommon sight to see wilted corn where the field has been cultivated.

Many growers commonly ask the question, "How many times should corn be cultivated?" This is best answered by saying that corn needs no more cultivation than it requires to kill the weeds in the field. Many excellent crops of corn have been produced without any cultivation. This is particularly true on "breaking" where the ground is usually very free of weeds the first season. Often, in the prairie states, the sod is plowed and planted to corn and a good crop grown without additional working.

The cost and labor of cultivation may be reduced greatly by using large implements in the first cultivation. The ordinary spike-toothed harrow is a very satisfactory implement for making the first cultivation of corn. The harrow may be used until the corn is 4 or 5 inches high without damage to the crop, and many small weeds are killed. This is a cheap but effective way of getting over the ground.

Practically all of the larger corn

growers in the corn belt are now turning to two-row cultivators. They are using these for all cultivations, including the first. Formerly, it was thought that the first cultivation could not be made with a two-row cultivator because the corn was so small and easily covered. With better implements, however, all the cultivations are being carried on with a two-row cultivator. Where one man could cultivate seven acres the third time over with a one-row riding cultivator, he can now cover 13 acres with a two-row cultivator. The two-row cultivator will become the common cultivation implement on all of the larger corn belt farms.

# Weeds or Crops

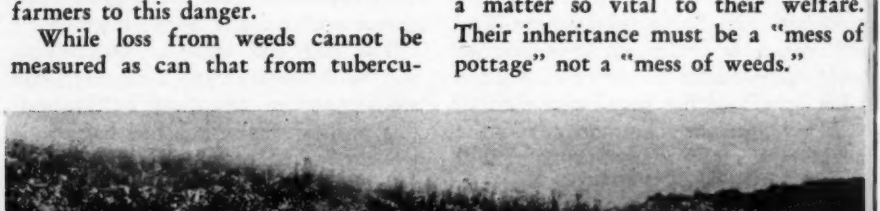
(*From page 25*)

Wherever they are allowed to go to seed, the Canada and perennial sow thistles are being spread over wide areas by the wind. Their seeds are carried from farm to farm by threshing machines and other farm tools. They are also carried in the seeds of the crops raised on the infested fields, and on top of all this they are slowly spreading on every infested farm through their underground parts.

The ultimate result of this is plain to see. There are many farmers who can clearly remember when Canada thistles, perennial sow thistles, and quack grass were practically unknown in localities where now they are taking possession of the farms. The growth of the infested areas has been rapid, but the old tradition that weed destruction was unimportant has blinded many to the real facts. Every influence which can be brought to bear must be exerted to arouse the farmers to this danger.

While loss from weeds cannot be measured as can that from tuberculosis, hog cholera, rust, or smut, it is no less great and no less real. The idea that it can be ignored has persisted too long. It is time a funeral was held over it. This is a case where without sorrow the spirit can be consigned to everlasting perdition with a hope that it may never be resurrected. The coming generation must be taught to view its inheritance from a different angle or agriculture will also find itself upon the funeral pyre.

While it may be true that the production of maximum crops is not now necessary, let us not leave to future generations a heritage of useless land areas made useless because we failed to do our duty by them. Increasing population requires increasing production. How can production be increased on noxious-weed infested land? Our descendants must not be allowed to curse us for criminal carelessness in a matter so vital to their welfare. Their inheritance must be a "mess of pottage" not a "mess of weeds."



**These thistles got their start in a small hillside pasture. The place is now a source of dangerous infection to the entire surrounding country.**

# Agriculture Today

(*From page* 22)

ing become established since that time. This pest is more destructive than the cotton boll-weevil, and Government inspectors are stationed at eight Mexican border ports to prevent additional entries of the insect. Fumigation houses in which from four to twenty freight cars may be disinfected at one time have been established at five border ports, all cars originating in infested districts of Mexico being fumigated immediately upon crossing the international boundary.

---

# Plowing in India

(*From page* 44)

him a prize for compensation, and chances are you have a loquacious convert. We are using this method with great success.

In planning a plowing competition, we provide five or six plows and arrange with some friendly farmer to allow us to use his fields. Each competitor is urged to bring his own pair of cattle. The field is laid out in strips about 50 yards long by 20 yards wide. At least 10 competitors must enter.

### *Treasure Prizes*

In a contest the winner, Devanbu, was a young Christian lad 18 years of age who had never seen an iron plow before. His pair of bullocks were accustomed to the wooden plow, but had never tried their strength on such an innovation from the West. He plowed like a veteran, turning a splendid furrow.

The prizes were provided by the Agricultural Department. For first prize a plow was given; for second prize a sack of improved paddy (rice) seed; and for third, a liberal quantity of green manure seed. The winner of the second prize, one of our agricultural school graduates, was very much disappointed not to get the plow as his prize. I suggested that possibly the boy who had won the first place would prefer the seed grain, the value of which he could appreciate, to his unknown quantity, the plow, and that an even trade might be a possibility. The unschooled village lad was not slow in replying, "No sir! I'm going to take this home to my village and show my friends what I have earned." He appreciated the iron plow's superiority over the old wooden stick. He had expressed his personality in that strip of plowing. He went home with the iron plow on his shoulder and his head high in the air. He had caught a new vision. He was a transformed youth.

So progress comes gradually but surely even in conservative rural India and through so humble a tool as the old walking plow that in its day blazed the trail with the covered wagon in the Mississippi and Missouri valleys. A plowing competition with the walking plow possibly would be as great a novelty in America today as in India. However, in the one it would be a relic of the past; in the other a prospect of the future.

# Flax

(*From page* 23)

Montana; and normally these four states grow over 90 per cent of the United States acreage. The Canadian production is found directly north of the region in the United States. Aside from the North American flax area composed of the regions in the United States and Canada, there are three important centers of production: the Argentine region, which is mostly the lowland bordering on the Parana River, and India and Europe.

### *The U. S. Imports Flax*

Flax is grown on a wide range of soils, but it seems to prefer well-drained land which retains moisture well. It seems to thrive under a wide variety of climatic conditions. The crop is sown in spring after small grains are seeded, and is harvested and threshed in a manner very much like wheat. Flax has been grown almost universally on new land, the disease problem on old land being serious. Furthermore, it does not compete well with weeds.

Almost the entire American production goes into oil manufacture, the oil being used in the making of paints, linoleums, and other important commercial products. Highly important by-products are oil meal and oil cake, which are an important source of protein for livestock.

The United States normally imports a considerable part of the flax consumed in this country, most of it coming from the Argentine Republic and Canada. It has been proposed many times that the American farmer should increase his flax acreage because of his favorable home market, but in spite of this the production is not expanding.

The production of flax fiber for the manufacture of linens is almost entirely a foreign industry, the United States importaing practically all of the flax fiber that it consumes. Most of these imports come from Russia, the United Kingdom, and the northern European countries, particularly Esthonia. Very little seed is grown in the regions of fiber production. The labor requirement of fiber production is so high that it is unlikely to advance rapidly under American conditions provided the foreign supply remains available.

---

# Tennessee

(*From page* 14)

Plot or field experiments have been carried out on the major types of soil throughout the State and it has been found that phosphorus, nitrogen, and lime constitute the principal need but that there are wide variations in the requirements of different soils. The greatest recent advance along this line is the separation of West Tennessee into two large divisions. The soils of one have no special need of phosphate, so that superphosphate can rarely be used profitably either by itself or in mixtures with nitrogen and potash.

This division covers, roughly, the western two-thirds of West Tennessee and includes most of the truck-growing areas where fertilizers have long been used.

The experimental evidence indicates that the good results obtained from the use of fertilizers on truck crops come largely from the nitrogen, and to a less extent from the potash of the commercial mixtures used, and that the phosphate has probably been used at a loss in many, if not most, cases. In connection with the low response to phosphate on western Tennessee soils, it is of interest to note that these soils do not analyze high in phosphoric acid, containing in the neighborhood of only one-tenth of one per cent. Another interesting fact is that the soils at the West Tennessee station, although unresponsive to phosphating, respond unusually well to liming. This is contrary to a well-supported claim from authoritative sources that acid soils are responsive to phosphating.

In contrast with soil needs of the western area, the eastern third of West Tennessee seems to be highly responsive to phosphate, superphosphate by itself being one of the most profitable fertilizers for general farm crops. Need of phosphate has also been found to be very pronounced on the Highland Rim soils of the type found in Middle Tennessee and in general throughout East Tennessee. Duplex basic phosphate has proved to be especially well suited to the Plateau soils, and on freshly cleared land may be used by itself to much advantage, especially as it partly supplies the soil's immediate need of lime.

### *On Other Soils*

With the exception of minor areas of gray "crawfishy" land, the soils at the West Tennessee station were found to be well supplied with potash, but poor in both nitrogen and lime. Wheat, for example, was decidedly benefited by both nitrating and liming, but there was no increase from phosphate even where the trial was continued for a score of years and all the crops were removed from the land.

In 10 years of experimental work at the Crossville substation on the Cumberland Plateau chiefly with three-year rotations of corn, potatoes, oats and clover and grass, phosphate has been found a first requisite for all crops, the response of the soil being very pronounced. Potash has been found profitable but much less so than phosphate.

Nine years of continuous experiments in a five-year rotation of corn-cotton, soybeans, wheat and clover, and grass (2 years), under a variety of fertilizer and liming conditions on the farm of the Middle Tennessee State Teacher's College at Murfreesboro, show profitable returns from the use of phosphate but not of potash on any crop. Nitrogenous fertilizers have given little or no profit. Liming, though not essential to most crops on the soils of this section, including red clover, was found necessary in the production of alfalfa and sweet clover.

Results obtained at the West Tennessee station with nitrate of soda in experiments continued from three to eight years show the increase that may be expected from various amounts of nitrate. The average increase from the light application of 40 pounds per acre was 80 pounds of seed cotton, from 120 pounds of nitrate 150 pounds, from 160 pounds of nitrate 225 pounds, and from 200 pounds 230 pounds of seed cotton. These experiments were made on land in a fairly good state of productivity. On much poorer lands considerably larger increases were obtained, as might be expected because as the crop increases the moisture supply becomes more and more the limiting factor.

The gray-colored, so-called "crawfish" soils, not only of West Tennessee, but in scattered areas throughout the State have been found to be deficient in potash to an appreciably greater extent than the surrounding soils of different character. Such land on the West Tennessee Station Farm has given marked response to potash

for such crops as cotton and various hay crops but has not been found profitable for any of the grain crops. A study of these gray-colored spots, which in the aggregate cover considerable area in the State and are not looked upon with favor by the farmers, promises information of much practical value. Tests indicate that when the special needs of this soil are supplied it is by no means as unpromising as its general reputation indicates.

### *Tobacco Experiments*

In 1927 the fifth in a series of fertility experiments with tobacco was completed at the Clarksville substation in the dark tobacco section of the State. The data secured were summarized in a report of the director as follows:

The efficiency of different sources of ammonia as shown in the increased production of leaf tobacco is as follows: first, sodium nitrate; second, ammonium nitrate; third, urea; fourth, amo-phos.

Applications of magnesia, either as a sulphate or chloride did not prove profitable, although slightly larger yields were obtained on the plots receiving these salts than on plots where none was used.

Data of the effects of previous cropping on the yield and quality of tobacco were obtained both with and without liming, and are summarized as follows:

1. Winter cover crops of cereals did not prove favorable; the yield and quality of tobacco after bare fallow being superior.
2. Red clover and sweet clover proved better than annual legumes.
3. The limed area appreciably outyielded the unlimed.

The soil was found to be responsive to potash as well as phosphoric acid and nitrogen. The average yields per acre for the five-year period were as follows:

1. 600 pounds of complete fertilizer without potash—909 pounds leaf.
2. 600 pounds of complete fertilizer with 2 per cent potash—968 pounds leaf.
3. 600 pounds of complete fertilizer with 4 per cent potash—980 pounds leaf.
4. 600 pounds of complete fertilizer with 5 per cent potash—984 pounds leaf.

The study of varieties of crops, their relative value and adaptability to Tennessee conditions, and their improvement by selection and breeding have always occupied a prominent place in the Station's work. The comparative ease with which an improved crop variety can be brought into general use to the immediate benefit of the farmer has caused the Station to increase its efforts along this line in recent years. Special attention is being given to corn and cotton but other crops are being worked with, such as tomatoes and garden beans which are grown both for shipping north and for canning plants in various parts of the State.

### *Cotton Varieties*

The Station has given particular attention to seven of the most promising varieties of cotton, and a uniform variety test has been organized and is now under way under the supervision of Professor Essary, station botanist, who has had long experience with this crop. These varieties have been studied in the field in the cotton counties of the State. It was found that they are the most widely grown varieties but it was also found that they vary greatly in different sections, are badly mixed, and lack uniformity as to lint characters, type, and time of maturity. New varieties and strains, as well as new selections made in the work, will be placed in the new strains test which will be continued over a period of years. About 300 crosses have been made between different varieties for the production of new strains.

Trice cotton, one of the best early varieties now grown along the north-

ern border of the cotton-producing area, was improved and introduced to general use by the Station and is recommended by stations in other states because of its adaptability to boll-weevil conditions as well as its suitability to the northern limit of cotton production.

The question of shedding buds and young bolls, selections of strains resistant to diseases of the leaf and boll, cultivation, thinning, and topping are other questions that are being given close attention.

After six years of field tests with all the leading varieties of corn subjected to like conditions as to soil and cultivation, the Station found Neal's Paymaster to be best adapted for general use and the most productive under Tennessee conditions. This variety was accordingly recommended and today is the leading variety in Tennessee, being grown on about one-third of the 3,000,000 acres planted to corn annually. It yields on an average nearly three bushels per acre more than other varieties, which means an increase of about $2,500,000 in the value of the State's corn crop annually.

### *Wilt-resistant Tomatoes*

Inbreeding through self-pollination is being done with 12 commercial varieties of corn including Delta Prolific, Neal's Paymaster, and Jarvis Golden Prolific. Such a breeding method brings out rapidly the defects and the good qualities inherent in the variety. L. S. Mayer, a specialist working in cooperation with the office of cereal crops and diseases of the U. S. Department of Agriculture, is devoting full time to the corn breeding studies with a view to securing superior strains.

The tomato industry which had grown in large proportions in the Humboldt section of West Tennessee was threatened with destruction by a wilt disease. The disease appeared about 25 years ago and gradually grew worse until whole fields were completely destroyed. It was critically studied by Professor Essary, and after a few years of work there was obtained by selection a tomato that is resistant to the disease and that will produce abundantly in fields where the common kinds fail. It was also found that the disease appears under continuous growing of tomatoes on the same land year after year and that crop rotation and seedbed sanitation will help to control it.

Work on the selection of tomatoes resistant to leaf spot is under way. A number of leading varieties used by canneries are being grown for study and selection for disease resistance.

At one time the red clover crop of the State was seriously injured by a fungous disease. By selection of seed from plants that withstood the disease, a resistant strain was developed by Professors Bain and Essary and red clover can now be grown successfully on land where it would ordinarily be a complete failure. A recent publication from the U. S. Department of Agriculture recommends it as the best for southern conditions, and it is being used in the Department's trials as the standard of comparison.

For a number of years comparisons of domestic and foreign strains of red clover have been made in plots. The object has been to show the relative resistance of the Tennessee disease-resistant, produced by the Station a number of years ago, and other strains, to the anthracnose disease of red clover. Very interesting results have been obtained in favor of the Tennessee resistant. Much interest in the Tennessee seed has been aroused by the experiments and a number of growers have undertaken to produce the seed for the market to supply the large demand for it in this and other states where anthracnose is serious.

In 1900 alfalfa was practically unknown in Tennessee. Today largely as result of the Station's advice there are over 12,000 acres producing hay worth a half million dollars annually

in addition to its value for pasture and soil improvement.

A distinct strain of lespedeza, or Japan clover, has been developed from the common variety which was once thought to be worthless. This new strain is more vigorous and productive than the common variety and has a more upright habit of growth so that it is especially suitable for hay. It is now beginning to be grown widely and will add hundreds of thousands of dollars to the value of the State's annual hay crop.

### *Tennessee's Pride*

By hybridization and selection the only beardless variety of winter barley that is hardy enough to go through the winter in Tennessee has been developed. This new barley, which is valuable for both hay and grain and which is recognized by the U. S. Department of Agriculture as the best of its type, is being extensively grown in Tennessee and is gaining in popularity in other Southern states.

From Culberson winter oats, an improved strain, which matures two weeks earlier than the Grey Turf commonly grown, has been obtained and found to be especially suited to rich land, where it stands up better and yields more than any other oats.

A selection from the Tokio soybean, which produces 20 per cent more hay than other varieties commonly grown and which would increase the value of the soybean hay crop in the State by $2,000,000 when the mass of the farmers adopt it, is recommended by the Station after a long series of tests with over 100 different varieties.

Insect pests damage Tennessee crops to the tune of $20,000,000 annually. The Station maintains a staff of trained men who study these insects and methods for their control. The value of sodium fluosilicate for control of the Mexican bean beetle and other insects as demonstrated by S. Marcovitch, the Station's entomologist, is one of the outstanding discoveries. The fluosilicates promise to displace paris green and other arsenicals now in common use because of both cheapness and efficiency. Also the fluosilicates will kill certain insects, such as the striped cucumber beetle and the blister beetle which are not killed by arsenicals and which were previously practically beyond control.

Tennessee is the leading livestock State of the South. The industry is valued at $100,000,000. There are many problems in connection with the industry which must be determined experimentally. The Station is at work on a number of these problems and its efforts are influencing the development and improvement of the industry. The pasture work of the Middle Tennessee Station is outstanding in this connection.

In the study of plant diseases, Dr. C. D. Sherbokaff has discovered new and improved methods for the sterilization of corn and of cottonseed, thus ridding the seed of disease germs which might later injure the crop. He has also recently determined the exact nature of a cotton disease which has in years past produced heavy losses along the Mississippi river both in Tennessee and in other states.

Dr. Margaret B. McDonald, biochemist, has discovered how to rid milk of onion odor and flavor. The method is highly satisfactory and is beginning to be used by dairymen and by at least one cheese factory in the State which now never refuses "oniony milk."

And so again it can be stated that the wealth realized by the State of Tennessee from the work of its Experiment Station runs into the millions of dollars. Furthermore, much of the research work done by agricultural scientists of the "Volunteer" State has spread beyond its boundaries to be adopted by other states in the improvement of their agriculture. Thus, Tennessee justifies and is proud of its Experiment Station.

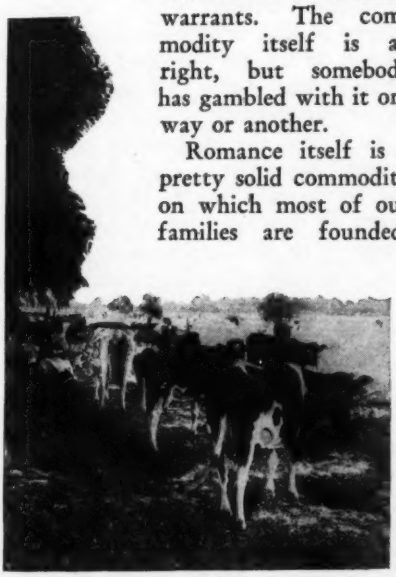
# Romance

(*From page* 4)

anniversary may not only be pleasing his wife but impressing his children as well. However, if he is a bear the rest of the year it won't do much good to "say it with flowers."

The greatest romantic stabilizer begins where charity does—at home. Those who depend upon libraries for it may become a trifle too liberal.

Romance that is lasting is more spiritual than biological, some library references to the contrary notwithstanding. A life-long romance partakes of a compromise more than a temporary convenience. Therefore, I think a little old-fashioned reading of Idylls of the Kings, Shelly, Keats, and the Songs of Solomon should be more generally encouraged. Youngsters don't have to believe it all, but neither should they take everything as literal in the pathological philanderings of our book-a-month scriveners. You see, romance is like some valuable commodity represented on the stock exchange. It may be kited higher than its real earning power or dropped lower than its stability warrants. The commodity itself is all right, but somebody has gambled with it one way or another.



Romance itself is a pretty solid commodity on which most of our families are founded, yet when the speculators start to tinker with it somebody is due for a bump.

I wish to stick pretty close in this theme to what I shall call *non-speculative* romance quoted at *par value*, without wildcat promotion or bucket-shop hazards. In doing so I may be ignoring some folks who are *blase* on the whole subject, but presumably they have quit reading before getting thus far anyhow.

I presume that the hearts of school boys and pioneers hold the finest native examples of romance in its virile and unsophisticated state. Masculine readers will join me in memories of some young and fondly worshipped classmate back in the days of freckles and patched trousers. Romance is put to its hardest test, after all, when the growing boy first becomes willing to wash his neck and ears. He is the butt of jokes and innuendo, if he openly caters to some feminine friend. If he hides his sentiment and pays his devotion in silent admiration, it places his romance on a par with Carlyle's heroes and hero worshippers.

The pioneer made reality of romance and romance of reality. He chose a wife early and loaded her and her dower into an ox-cart bound for uncharted empires. Our western states were built by men and women who staked their all on high endeavor tinged and ripened with romance. There was sentiment, but it was the sentiment of sacrifice and substance combined. Courting was more restricted in those days to young people of the immediate neighborhood. In this connection it is interesting to suggest some research work for psychologists on the relation of individual transportation systems to the widening of marriage horizons.

Prehistoric man walked or harnessed the dinosaur, perhaps. Finally he got to using the donkey as a symbol and a means of following his romantic bent. About the time that Baalam had trouble with a balky one, swains turned to the Arabian horse for fleet

and more successful elopements. As horses were high priced, most of the pioneers in America took to the ox-team, which may not have slowed down courtship but it narrowed its boundaries. With oxen the early choice of the heart had to be right to begin with, for bridal journeys were tedious and fraught with peril to hasty natures who wanted their own way about things. Then, later when I was in Milne's "very young" stage, the amorous couples used to pedal by our doors on "tandems built for two" with songs to match their Victorian simplicity. The only modern survival of those tandems is the side-car that catches the dust beside motor cycles.

But now the scene changes once more. Our sophisticated automobile sparkers are longing to dash away on the wings of a petrol Pegasus far off in the clouds to meet some enamorata beyond the borders of Mexico or Peru. If this does not end the international squabbles by the simple expedient of intermarriage, then the invention of the airplane is not Wright but wrong.

In due time we may set up our justices of the peace in shanties by the side of the aerodrome, so that quick justice may be meted out to those who flutter down with their lunches and licenses. I witnessed a wedding in an airship at a state fair last year, and I have since wondered how long it took them to return to earth and get their feet on the ground.

NEVERTHELESS, there is some thought in the expansion of courting range which progress has evolved; which means that the chances of neighboring boys and girls marrying each other is less than before. Doting mammas are thus shorn of their erstwhile power of persuasion, as the knots are tied by machinery more than by conspiracy. So the romance of invention and discovery has a double meaning, and possibly therein lies some hope for eugenics yet.

In the old days the girls who waited longest for partners were called "wall flowers," whereas nowadays the shy and quiet ones are known as "flat tires" or "covered wagons."

Cynical ones who believe that all youth is either flaming or burned out have decided that sentiment and romance are no more, and that it is either money or mania that feeds the marriage mill. It is only the externalist, the sophomoric guesser, who is responsible for such prevalent ideas. The folks who know their humanities are better informed and not so easily dismayed.

Puritanism of a violent type left an imprint of Comstockian mock morality on American life. Their crusades were crude because they made the very things attractive which they wished to banish and crush. They could not keep their blue law tentacles off romance either, and made of it something either farcical and hopeless or entirely taboo. The only element of strength in our lives that kept a decent respect for romance in us was the idealistic home-and-mother type of American woman. The heart of American society worth while is formed of that same innocence and romance, which she nurtured through a whole century and a half against blundering interference.

Look up the definitions of "romance" they put in the dictionaries and see what a bungle they made of it out of their own perverted conceptions. The dictionary says that romance is either something "chivalrous" and cloyingly "gallant" or else it is defined as "fantastic and fictitious." How mother ever made it real and human to us when she had all those bookish denials to face is beyond me!

If romance has had a reaction from those long-faced periods of sanctified repression, perhaps it is not wholly bad after all.

If Puritanism had a hand in this

business of romance bungling, so did Prosperity and Pragmatism. Prosperous and pragmatic men began looking for "class and caste" in marriage instead of moonlight dreams and affection. The girls had to meet the current demand and dress and act accordingly. They had to match the upholstery of a limousine and know how to swing a golf-stick as well as a lip-stick. The livery stables went out of business, sleigh rides were forgotten, and father sits up alone with the radio, instead of winding the clock as a hint to the lovelorn.

ROMANCE may have begun in mythology, but it didn't end there. You and I recall the times when we struggled with the names and doings of the big bugs on Olympus and their earthly devotees. The list of Grecian notables in romance is a hefty one. There are Admetus and Alcestis, true to the death; Ulysses and Penelope, who learned that absence makes the heart grow fonder; Orpheus and his beloved Eurydice, whom he sought in Stygian realms; Diana's love for the shepherd boy, Endymion; Aurora who made Tithonus immortal but forgot to make his youth lasting; Hector and Andromache, the faithful Trojans; and that ancient triangle case of Paris of Troy and Helen and Menelaus of Sparta. I would give you some others bearing names suitable for cigars or new auto models, but such is enough.

These were symbolical of moral, religious, and philosophical fervor, or legends touching the powers of nature and the wonders of earth and the seasons. Please note that chiefly the nicest ones have survived. Those others of allegorical horror, such as Vishnu and Siva of the Hindus, the Juggernaut of Calcutta, Osiris and Isis of Egypt, have mostly vanished from our literature with the gorgons, hydras, and the basilisk.

The Hebrew contribution to romance is closely woven with religion and cult, and such characters as Isaac and Rebecca, Ruth and Boaz, David and Rachel are the patriarchal precursors of the work of monks and paladins who delved in crusades for the Holy Grail and orthodox imagery.

The original adoption of the love romance must be blamed on the people of southern France, or the Provencals. Their soft and easy civilization and polished and settled government gave rise to troubadors, whose dialogues in verse eulogized the fine points of love's casuistry.

On the contrary, the Norman French and the northern nations went

in for adventure and the strong right arm encased in hardware. Their tales of chivalry and flowering knighthood were retailed by bards and harpists, called trouveneurs, who sought examples of piety and courage in Arthur and Charlemagne.

So we see that some folks in history liked love romance, others preferred fighting romance with a little swashbuckling to boot, while another group pledged their loyalty to religion with equally fervent romantic expression. I do not know which kind you descend from, nor do I care, but my situation takes in all three more or less. It all depends on the advertising and the price of seats.

At any rate, we have inherited it all and must live with it somehow. There is love romance, religion romance, and adventure romance—each a potent force behind us and taught in our churches, schools, and everyday lives. I shall add one more.

IF we puzzle over the changes in youth toward love romance, may we not also find some changes in the aspects of religion romance and adventure romance; not that we are less susceptible to tenderness or refinement, but we have had to transform our customs with the tremendous growth of that *fourth* branch of romance—the romance of knowledge, science, and invention.

Look over the books on the subject of the romance of progress. Just a few show the meaning, such as Daguerre and the photograph; Faraday and the dynamo; James Watt and the engine; Roentgen and the medical rays; Edison and the electric light and phonograph; Wright Brothers and the airplane; Laws and Gilbert and the soil; Pasteur and biologics; De Forest and the radio—and on without end. Just one or two of those headliners in the myriad of such workers would outshine the flashes of Jove's lightning and outtrick the legerdemain of Olympus and the Round Table. Yea, verily there is more romance in one Tin Lizzie than in all the chariots of the gods!

Romance began, remember, and found encouragement when even princes and noblemen could not read or write. Nowadays romance has a far stiffer grade to climb when education is universal and critics and cynics are eager to defame and belittle things. Thus in reality, instead of having less romance today, we have vastly *more* of it.

And as for the ethical portion of romance, it will not suffer by comparison with the ignorant days of old when men were thrown to the lions for sport's sake and endured torture for a Roman holiday.

Romance today must be real he-man romance, the kind that stands the gaff and fills the bill. No more dodging or fairy tales to explain something unknown or to be avoided. The cards are all on the table now, and even the kids know a royal flush.

I crave no pardon for quoting Tennyson instead of the votaries of modern *verse libre*, as follows; the part where Vivien croons to Merlin:

"In Love, if Love be Love, if
Love be ours,
Faith and unfaith can ne'er be equal
powers;
Unfaith in *aught* is want of faith in
all:
It is the little rift within the lute
That by and by will make the music mute,
And ever widening, slowly silence
all."

So it matters not whether you are married to the romance of service, the romance of knowledge, or the romance of home-making, there is bound to be plenty of adventure in all, and, of course (if your heart is in it) plenty of love.

And when all forms of love and adventure are gone from the timepiece of life, then, regardless of how many jewels the case contains, the main spring is busted!

## ORIGIN OF HARUM-SCARUM

A sultan at odds with his harem
Thought of a way he could scare 'em;
He caught him a mouse
Which he freed in the house,
Thus starting the first harum-scarum.

---

Banker (telephoning) — "Mr. Cohen, do you know your account is overdrawn $17?"

Mr. Cohen—"Say, Mr. Banker, look up a month ago. How did I stand then? I'll hold the phone."

Banker (returning to the phone)—"You had a balance of $400."

Mr. Cohen—"Vell, did I call you up?"

---

Bernard like other small boys of his age generally found himself in trouble of some kind. Finding that words had but little effect upon his offspring, the father resorted to sterner measures.

A neighbor watching him chastise the boy, noticed with admiration that Bernard gave no outward indication of the pain he was suffering.

"Don't you ever cry when you're beaten, Bernard?" he asked.

"What's the use," retorted the boy. "The old man's deaf!"

---

## NEEDS PRACTICE

First Stout Girl: "Madge lost ten pounds in two weeks by worrying."

Second Ditto: "I tried that, but I couldn't keep my mind on it."

## A LOONY COUPLE

"They say Boggs is crazy on the subject of golf and his wife is equally crazy over auction sales."

"Yes, and the funny part of it is they both talk in their sleep. The other night a lodger in the next flat heard Boggs shout 'Fore' and immediately Mrs. Boggs yelled 'Four and a quarter'."—*Wall Street Journal.*

---

Bessie came running to her grandmother, holding a dry, pressed leaf, obviously the relic of a day long gone by.

"I found it in the big Bible, Grandma," she said, round-eyed. "Do you suppose it belonged to Eve?"

---

Just one last word of caution—keep an eye on the melon patch! Your neighbor's boy is no better than you were, and he's a half brother to the rabbits anyhow.

---

## WHY NOT?

Mrs. Prim: "I didn't see your husband in church this morning."

Mrs. Glim: "No, he doesn't dare go now."

Mrs. Prim (shocked): "Doesn't dare go? Why?"

Mrs. Glim: "Last Sunday the pastor prayed for the loose livers of the parish. After the service my husband asked him if he wouldn't slip in just a few words about his floating kidney—and the minister threw a hymn book at him!"

# Plenty *of* Potash *in your* Fertilizer?

THE results of 30 fertilizer demonstrations in Tennessee, Mississippi, Arkansas, Louisiana, and Texas show that increasing the potash content of the fertilizer from 0% to 8% increased yields of seed cotton an average of 242 pounds per acre. Three fertilizers were compared in each demonstration—8-6-0, 8-6-4 and 8-6-8. Here are the average yields:

| FERTILIZER PER ACRE | SEED COTTON PER ACRE |
|---|---|
| 600 pounds 8-6-0 | 850 pounds |
| 600 pounds 8-6-4 | 990 pounds |
| 600 pounds 8-6-8 | 1,092 pounds |

Note that $1.20 worth of potash in the 8-6-4 returned $9.80 in extra seed cotton per acre. The $2.40 worth of potash in the 8-6-8 returned $7.14 in extra seed cotton over the 8-6-4, or $16.94 more than the 8-6-0.

Make sure that your fertilizer contains plenty of potash, as indicated by the last figure in the analysis. Extra potash pays extra cash. It keeps your cotton on the job.

*Write our nearest office for free information on how hundreds of farmers got extra cash from cotton.*

**Agricultural and Scientific Bureau**

## N. V. POTASH EXPORT MY.

**of Amsterdam, Holland**

**Hurt Building**
**ATLANTA, GA.**

**Lampton Building**
**JACKSON, MISS.**

# POTASH *PAYS*

Printed in U. S. A.